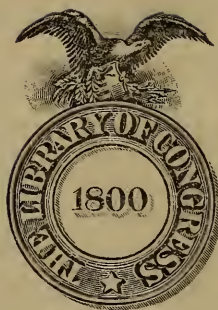


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ARMOR PLANT FOR THE UNITED STATES

HEARINGS

BEFORE THE

COMMITTEE ON NAVAL AFFAIRS UNITED STATES SENATE

SIXTY-FOURTH CONGRESS

FIRST SESSION

ON

S. 1417

A BILL TO ERECT A FACTORY FOR THE
MANUFACTURE OF ARMOR

Printed for the use of the Committee on Naval Affairs



WASHINGTON
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APR 10 1916

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ARMOR PLANT FOR THE UNITED STATES.

TUESDAY, JANUARY 18, 1916.

UNITED STATES SENATE,
COMMITTEE ON NAVAL AFFAIRS,
Washington, D. C.

The committee assembled at 10.30 o'clock a. m., pursuant to the call of the chairman.

Present: Senators Tillman (chairman), Swanson, Chilton, Lewis, Phelan, Pittman, Penrose, Clapp, and Poindexter.

The CHAIRMAN. Senator Penrose, if you are ready to proceed, we can now begin the hearing on the armor-plate question.

Senator PENROSE. All right, Mr. Chairman. There are representatives here from the Bethlehem Steel Co., the Carnegie Steel Co., and the Midvale Steel Co.; and I would suggest, in order to expedite the hearing, that Mr. Grace, representing the Bethlehem Co., begin the proceedings.

The CHAIRMAN. Are you ready to be sworn, Mr. Grace?

Mr. GRACE. Mr. Chairman, I shall be glad to be sworn.

Senator PENROSE. Shall I ask Mr. Grace one or two preliminary questions first?

The CHAIRMAN. Yes.

Senator PENROSE. Will you state your official position in connection with the Bethlehem Co., Mr. Grace?

Mr. GRACE. I am president of the Bethlehem Steel Co.

The CHAIRMAN. Before you proceed further let us swear Mr. Grace.

Senator PENROSE. I do not think that should be done.

The CHAIRMAN. Well, he is giving evidence, before the committee, for the use of the Senate.

Mr. GRACE. I have no objection, Mr. Chairman.

Senator POINDEXTER. The usual practice is to swear him.

The CHAIRMAN. I think so.

Senator PENROSE. I do not think it is.

Senator CHILTON. Have we any power to swear the witness?

Senator PENROSE. I do not think so.

The CHAIRMAN. Yes; we have power to send for witnesses, and to administer oaths.

Senator CHILTON. All right.

Senator PENROSE. I have never heard of that being done before.

(Thereupon, the witness was duly sworn, according to law, by the chairman.)

Mr. GRACE. Shall I proceed now, Mr. Chairman?

The CHAIRMAN. Yes; we shall be glad to have you do so.

STATEMENT OF MR. EUGENE G. GRACE, PRESIDENT OF THE BETHLEHEM STEEL CO.

Mr. GRACE. I should like, for the benefit of the committee, to make as brief a statement as I can as to the development of the armor-plate industry by our company. I think that is quite necessary, if we are to properly get before the committee the position we find ourselves

in to-day, on account of legislation proposed by this committee before the Senate, for the creation of a Government armor-plate plant.

I have been connected with the Bethlehem Steel Co. since 1899. During that period, from that time up to this, I have gone through practically every branch of its business. I have been connected for time with the armor-plate department and the steel-making department, and all departments which would have any connection at all with the making of the armor.

We began—the old Bethlehem Iron Co. entered the business of making armor plate in 1887. They naturally went into the business to make some money. I presume that was the object of our predecessors.

Senator CHILTON. Was that when the company was controlled by Joseph Whorton?

Mr. GRACE. Mr. Whorton was connected with the company at that time; and old Uncle John Fritz, one of our ablest ironmasters.

From that period up to the present there have been three distinct phases or cycles in the manufacture of armor. We started first with the old, homogeneous armor, requiring a certain class of equipment. That was purely a good grade of steel—no heat treatments or anything of that kind, which developed a little later. That developed one type of plant and one type of equipment.

We then developed to what was known as the “Harvey” armor. That was defined by a change principally in the chemical composition of the steel used.

And from the Harvey armor we enter into the present character of armor, known as the “Krupp cemented armor.” There were three distinct phases, three changes of plant, and a lot of the plant becoming obsolete and having to be scrapped and thrown away on account of the development of the industry. We started with a plant with the capacity, ostensibly, of about 5,000 or 6,000 tons yearly. In 1902 the United States Government launched us on a larger and modern naval program. The armor-plate capacity of the country at that time was not sufficient to meet the needs and requirements of the new naval program. We were specially requested—almost commanded—to increase, or to double, rather, our producing capacity at that time. That was in 1902.

Senator PENROSE. What administration was that under, Mr. Grace, if you remember?

Mr. GRACE. I could not say; it could easily be ascertained.

Senator CHILTON. That would be in Roosevelt’s administration.

Mr. GRACE. Was Roosevelt President at that time?

Senator CHILTON. Yes; in 1902.

Mr. GRACE. I am not sure who was President at that time.

Senator SWANSON. That was in 1902; what manufacturers were engaged in the manufacture of armor plate in 1902?

Mr. GRACE. The Carnegie Steel Co. and the Bethlehem Steel Co.

Senator SWANSON. What was the annual capacity of those two plants?

Mr. GRACE. The annual capacity of those two plants at that time was about 10,000 to 12,000 tons jointly; and we were asked, both of us, to double our capacity to meet the new requirements. The Midvale Co., according to our records, did not come into the field until about 1906. I think possibly they will confirm that statement themselves.

I should like to place before the members of the committee, so they can follow me in my talk, two or three exhibits if it would meet with the pleasure of the chairman, and I think it would be interesting to the committee.

Senator SWANSON. Do you wish to insert those in your evidence?

Mr. GRACE. I would like to have them before the committee to talk about. I think it would be easier for them to follow some of the things I am going to say.

Senator SWANSON. Are they figures?

Mr. GRACE. Yes; they are figures showing the history of the armor-plate manufacture.

Senator SWANSON. I understand that you wish to distribute them to the members of the committee, and then to insert them in the record?

Mr. GRACE. I would like to distribute them now, because I think it would assist us in discussing the matter, if the chairman will permit me to do so.

The CHAIRMAN. All right; you may do so.

(The exhibits referred to are as follows):

EXHIBIT A.

Prices and tonnage of armor plate bought by the United States from the Bethlehem Steel Co. from 1887 to 1915, inclusive.

| Date. | Base price. | Tonnage of contract. | Remarks. |
|---------------|-------------|----------------------|-------------|
| 1887..... | \$510.00 | 6,702.60 | |
| 1893..... | 520.00 | 3,562.24 | |
| 1896..... | 515.40 | 2,653.00 | |
| 1898..... | 400.00 | 3,964.47 | |
| 1899..... | 400.00 | 1,142.19 | |
| 1900..... | 420.00 | 18,588.00 | |
| 1903..... | 420.00 | 3,362.00 | |
| 1903..... | 420.00 | 5,986.00 | |
| 1905..... | 420.00 | 4,959.00 | |
| 1906..... | 346.00 | 1,824.00 | |
| 1907..... | 420.00 | 3,579.00 | |
| 1909..... | 420.00 | 3,137.00 | |
| 1909..... | 420.00 | 4,594.00 | |
| 1911..... | 420.00 | 2,257.00 | |
| 1911..... | 420.00 | 2,212.00 | |
| 1912..... | 420.00 | 5,022.00 | |
| 1913..... | 454.00 | 2,669.00 | 8-hour law. |
| 1913..... | 440.00 | 2,602.40 | |
| 1914..... | 425.00 | 16,256.00 | |
| 1915..... | | | |
| 29 years..... | | 95,072.00 | |

Average yearly award, 3,280 tons.
Average base selling price, \$432.62 per ton.

EXHIBIT B.

Prices which different Governments pay for armor plate as shown by the Naval Yearbook compiled in the office of the Naval Affairs Committee of the Senate.

PRICES PAID FOR ARMOR BY PRINCIPAL NAVAL POWERS.

| | Turret armor. | Krupp side armor. |
|--------------------|--------------------|--------------------|
| Japan..... | ¹ \$490 | ¹ \$490 |
| Austria..... | ¹ 729 | ¹ 511 |
| Italy..... | ¹ 444 | ¹ 405 |
| Germany..... | | 490 |
| France..... | ¹ 598 | ¹ 460 |
| England..... | ¹ 691 | ¹ 503 |
| Russia..... | ¹ 510 | ¹ 368 |
| United States..... | 496 | 425 |

¹ Same as in last Yearbook; no new information.

EXHIBIT C.

COST OF PRODUCING ARMOR PLATE UNDER VARIOUS CONDITIONS.

The production cost of armor with shop operating at full capacity has been determined as follows:

Report of Niles Board, House Document No. 193, Fifty-ninth Congress, second session, \$244.27 per ton.

Report of Tillman Board, House Document No. 1620, Sixty-third Congress, third session, \$262.79 per ton.

(The later report reflects advances in cost of labor and material and is quite consistent with the earlier report considering the differences in the dates at which they were made.)

With plant operating at less than full capacity, the Niles Board found that the cost would be increased as follows:

Plant operating at half capacity, cost would be increased 20 per cent.

Plant operating at one-third capacity, cost would be increased 30 per cent.

These reports give mere shop cost and do not contain many items that enter into the actual total cost, such as administrative and general expense, insurance and taxes, interest on plant investment and working capital, etc., and in the following tabulation is shown the effect of the addition of some of these very real and important items. The depreciation of the plant, although a real addition to cost, is not included below, as it is shown that prices actually received by the manufacturers has not been sufficient to allow anything for this purpose.

| 1 | 2 | 3 | 4 |
|---|--|---|---|
| | Cost per ton with plant provided with sufficient contract tonnage to operate at full capacity (10,000 tons). (This is a condition that has never been maintained.) | Cost per ton with plant provided with only sufficient tonnage to operate at one-third capacity. (This approximately represents actual average conditions that have obtained.) | Cost per ton with plant provided with sufficient tonnage to operate at two-thirds capacity. (This condition might obtain as a result of the proposed 5-year program.) |
| Production cost, plant operating at full capacity (Tillman report)..... | \$262.79 | \$262.79 | \$262.79 |
| Add for plant operating one-third capacity, 30 per cent (Niles report)..... | | 79.60 | |
| Add for plant operating two-thirds capacity, 10 per cent (taken proportionately from Niles report figures)..... | | | 26.28 |
| Total production cost..... | 262.79 | 342.39 | 289.07 |
| Administrative and general expense (\$100,000 per year)..... | 10.00 | 30.00 | 15.00 |
| Taxes and insurance (\$45,000 per year)..... | 4.50 | 13.50 | 6.75 |
| Interest at only 5 per cent on \$7,100,000 plant (\$355,000 per year)..... | 35.50 | 106.50 | 53.25 |
| Interest at only 5 per cent on \$500,000 working capital (\$25,000 per year)..... | 2.50 | 7.50 | 3.75 |
| Total..... | 315.29 | 499.89 | 367.82 |

If the contracts awarded in the future should be in the same average quantities as in the past (namely, 3,280 tons per year, or about one-third our plant capacity) the present price of \$425 per ton would provide as follows:

| | Per ton. |
|--|---------------|
| Contract price..... | \$425. 00 |
| Less— | |
| Production cost (column No. 3)..... | \$342. 39 |
| Administrative and general (column No. 3)..... | 30. 00 |
| Taxes and insurance (column No. 3)..... | 13. 50 |
| | <hr/> 385. 89 |

Leaving for interest on investment..... 39. 11

With contracts for 3,280 tons, this would provide only \$128,280.80 per year, or less than 1½ per cent on the investment without any provision whatever for repayment of the capital invested in the plant when it may have to be abandoned, owing to the building of a Government plant or some radical change in the method of manufacture.

EXHIBIT D.

COMPARISON OF ARMOR-PLATE BUSINESS AND A STANDARD STEEL MANUFACTURING BUSINESS.

| | | |
|---|--------|----------------|
| The \$7,100,000 invested by Bethlehem Steel Co. in its armor-plate plant and appurtenances would be sufficient for the building of a rolling mill with an annual capacity of..... | tons.. | 400,000 |
| During the 29 years the armor-plate plant has been in operation this mill would have produced..... | tons.. | 11,600,000 |
| Where the armor-plate plant produced..... | tons.. | 95,072 |
| The product of the mill would sell at about \$35 per ton, on which a moderate profit would be 10 per cent, or \$3.50, per ton. | | |
| The mill would, therefore, earn per year..... | | \$1,400,000.00 |
| The average total selling price of armor produced in a year was only 3,280 tons, at \$432.62..... | | 1,418,993.60 |

So the armor plate would have had to cost absolutely nothing to manufacture to produce the same profit as an equivalent investment in an ordinary rolling mill.

Mr. GRACE. The first exhibit (see Exhibit "A," p. 7) we place before you is a record of the armor-plate business which the Bethlehem Steel Co. has enjoyed from the United States Government, showing the year, the price, and the amount of tonnage contracted for.

You will note that for a period of 29 years, from 1887 to 1915, inclusive, our company has manufactured 95,000 tons of armor plate, or an average of 3,280 tons per year. During that period we have enjoyed prices ranging from \$346 a ton to \$520 a ton. The average deducted from these figures gives us an average selling price of \$432 a ton. To-day's selling price is \$425 a ton.

I think at this point it would be quite in order to refer to the manner of letting armor-plate contracts up to the present administration's advent. It had been the policy of the administrations to confer with, negotiate, and lay before the armor-plate manufacturers, in joint conference, the needs of the Government, and endeavor in that way to agree on what was a fair and proper price for armor. We, during that period, freely laid before any investigating committees, Secretaries of the Navy, chiefs of bureau, and inspectors at our plant what we were doing; what our costs were; and our methods of manufacture; and, in line with that situation, our industry was investigated by what was known as the Niles Board, at a time when it was thought that \$420 a ton was an excessive price for armor plate. I am not going to attempt to read the Niles report; that is on record, and I take it that this committee are familiar with it.

It was, however, very clearly established—and if I am not mistaken, there was legislation passed by the National Senate and House of Representatives, stating what should be the top price, the high price at which armor could be contracted for. The price of \$420 was used as being a fair, honest price, not excessive, as a return on the investment which we had placed in the plant.

The CHAIRMAN. What year was that, Mr. Grace?

Mr. GRACE. The Niles Board was in 1905, as I remember; I think they did their work in the years 1904 and 1905.

The CHAIRMAN. That was after the Midvale people came into it?

Mr. GRACE. No; that was before the Midvale people came into it; the Midvale people came in in 1906.

The CHAIRMAN. I think the Midvale people came in in 1902.

Mr. BARBA. It was 1904.

Mr. GRACE. 1904, was it?

Mr. BARBA. Yes.

Mr. GRACE. Well, it was about that time, then. The Niles report we have here, if the members of the committee want to refer to it.

Senator CHILTON. Is that a Senate document?

Mr. MATTHEWS. No; it is House Document No. 193.

Senator CHILTON. What session of Congress?

Mr. MATTHEWS. The Fifty-ninth Congress, second session.

Mr. GRACE. We cooperated very freely and openly with the Niles Board in their investigations. We gave them our cost of plant; we gave them out processes; and I feel, from the character of their report, that they were convinced that we were not robbing the United States Government, which we had been so frequently accused of doing.

The next official investigating committee was Senator Tillman's investigating committee of last year, 1915. The Niles board reported certain costs for the making of armor. Senator Tillman's committee had the additional province of reporting the cost of making armor, and reporting the cost of constructing a plant in which to make armor.

Before I compare those costs, I want to ask the members of the committee to look at Exhibit B (see p. 8), which is very short and concise, as taken from the Naval Yearbook, as compiled by the Senate Committee on Naval Affairs, showing the prices for armor paid in other countries, as compared with the prices in the United States.

We found that five important naval powers, Japan, Austria, Germany, France, and England, are all paying a substantially higher price for armor than the United States. Japan, I may point out, has a Government plant, and in that Government plant, the statistics show that it is costing them \$490 a ton.

Senator SWANSON. Where did you get this information from?

Mr. GRACE. I got this information from the Naval Yearbook, prepared this year by the Senate Naval Committee.

Senator SWANSON. How far back does this information of yours concerning prices in those countries go? Does it cover the same period as that for which you averaged the prices you received for armor plate in this country?

Mr. GRACE. No; I take it that this compilation is what was paid this last year in these respective countries.

Senator SWANSON. You have made no estimate covering the same number of years that you have figured on, showing the amounts paid by those foreign Governments, have you?

Mr. GRACE. No; my object was simply to compare what they are paying to-day with what it costs the United States; and I have used this committee's information in doing that. But I do think it is characteristic when we remember that Japan has its own Government plant, and no other private source of getting armor.

Senator CHILTON. I suppose the difference will appear between the turret armor and the Krupp side armor. I do not see that difference stated here.

Mr. GRACE. The turret armor is a difficult armor to make, from its method of fabrication, the bend, the fact that lots of it is cut out for the receipt of the guns and the port holes, and things of that class. So the armor is divided into two classes; but we always talk of class A armor, or base price armors; the Niles Board report and Senator

Tillman's committee report are based on that. I should not pay much attention to turret armor; it is a special class. The principal class is class A armor, or what is known in this classification as Krupp side armor. That is the way we always talk, and that is the basis of our prices.

The CHAIRMAN. How came the Bethlehem Co. to go into the manufacture of armor?

Mr. GRACE. In cooperation with the United States Government. The Government needed armor, and the Bethlehem Steel Co. thought it would be a profitable industry to enter. I presume that was what was in their minds.

The CHAIRMAN. Was that the only reason?

Mr. GRACE. If you wanted to you could say that our plant, our industry, was primarily an ordnance industry at that time; that is, the making of all classes of ordnance products, guns, armor, ammunition, projectiles. Now, my predecessors, the old Bethlehem Iron Co., I presume that was what was in their minds; at least that would be close to it, because the old Bethlehem Co. was developed as a Government ordnance plant for the purpose of making all character of war materials, and we are proud of the position by which they called us the "Krupps of America." We believe it is an asset, and a strong one, to the United States.

The CHAIRMAN. Your company was the first company that manufactured armor in the United States?

Mr. GRACE. The first that manufactured armor in the United States, and then followed the Carnegie Co.

The CHAIRMAN. And you had to go to some extraordinary expense to do that? You had a large steel plant, but you could not make armor without additional machinery and appliances?

Mr. GRACE. That is correct.

The CHAIRMAN. Involving heavy expenditure?

Mr. GRACE. But in those days, back in 1897, our steel plant naturally was not in the same proportions as it is to-day, by any means.

The CHAIRMAN. Of course not.

Mr. GRACE. It was a very small plant, but it was the policy and line of development the old company laid down for itself, and we were glad of the opportunity to go into the armor plate manufacture on the prices given.

The CHAIRMAN. Then on the prices given by the United States, you claim that you were not compensated for that additional expenditure?

Mr. GRACE. Certainly not, as we will bring out in the very next exhibit, which I am going to ask you to look over with me.

Senator SWANSON. If it would not interrupt you, I would like to ask this question: Did you ever sell armor to any foreign countries at all?

Mr. GRACE. Yes, sir. In small tonnages, which would not be sufficient to affect the operations of our plant.

Senator SWANSON. Have you the prices at which you sold to the foreign governments?

Mr. GRACE. Have I got them?

Senator SWANSON. Yes; have you those figures here with you?

Mr. GRACE. No, I have not got them here; but I think I could give you some general idea of them.

Senator SWANSON. Could you furnish the committee the prices at which you sold armor plate to foreign Governments at the same time that you were selling it to the United States Government?

Mr. GRACE. We have sold to foreign Governments only in small quantities; one of such contracts which I think will answer your question, was a sale to the Russian Government. That contract was made at a price lower than our then reigning prices to the United States Government.

Senator SWANSON. Will you furnish the committee with the dates of sales and the prices, and the amounts of armor that you have sold to foreign Governments?

Mr. GRACE. I have no objection at all. I can not tell you now, because I have not the information with me.

Senator SWANSON. I mean, you can send us that information, can you not?

Mr. GRACE. Certainly; I have no objection at all.

The statement referred to is here printed in full as follows:

Foreign armor plate contracts received by Bethlehem Steel Company.

| Name of Government. | Date of contract. | Tonnage of armor. | Price per ton. |
|--------------------------|-------------------------|-------------------|--|
| Russia | Dec. 16-28, 1894 | 1,115 | \$249 per ton for nickel steel or harveyized. |
| Do | May 15, 1895 | 224 | Do. |
| Do | Nov. 27-Dec. 9, 1895 .. | 1,137 | £107 per ton—approximately \$524. |
| Italy ¹ | July, 1911 | 2,050 | \$438.85 per ton. |
| Do. ¹ | Oct., 1911 | 780 | \$426.50 per ton. |
| Japan ¹ | May, 1912 | 25 | £80 per ton—approximately \$390. Comprising 3 plates only, to be tested with a view of securing an order if tests proved satisfactory. |

¹ Foreign armor not manufactured under 8-hour law.

Senator PENROSE. Of course, when the Bethlehem Co. went into this enterprise they were taking a risk, because there was no assurance of a Government policy?

Mr. GRACE. Other than the representations given to us by the then existing officers of the Government, and which were given us continuously up to the present administration; that they desired the industry development; that they desired to develop it with us.

Senator PITTMAN. Is there any record of those negotiations?

Mr. GRACE. I am afraid we could not locate those records, unless they have them here in Washington. I think it was in 1906 or 1907 that we lost all of our records in our general office by a fire.

Senator PITTMAN. Were the negotiations looking to the building of this armor plant conducted through officers of the Government?

Mr. GRACE. They were conducted with officers of the Government.

Senator PITTMAN. Were they conducted in writing or merely by conferences?

Mr. GRACE. Both, I think, Senator Pittman.

Mr. DINKEY. It started with an advertisement by the Government, in the regular way, and finally it got down to only one company.

Senator PITTMAN. You do not know whether there are any of those records available or not, Mr. Grace?

Mr. GRACE. I do not believe we have any, because we lost all of our records by fire. The Niles Board report makes that statement,

that the then existing companies were requested to double their capacity.

Senator PENROSE. As I understood Mr. Dinkey, the Government advertised for armor plate.

Mr. DINKEY. The inception of it was in an advertisement of the Government.

Senator PENROSE. That is, an advertisement addressed to home and foreign manufacturers; if the Bethlehem Co. had not gone into it, the Government would have got the armor plate from English interests, would it not?

Mr. DINKEY. Yes; there would have been no other place to get it.

Senator PENROSE. There would have been no other place to get it.

Senator POINDEXTER. What year was that?

Mr. DINKEY. That was in 1897.

Senator POINDEXTER. You said there was no other place to get it; what year was that?

Mr. DINKEY. About 1897.

Senator POINDEXTER. 1897?

Mr. DINKEY. 1887.

Mr. GRACE. I think the Carnegie Co. started very shortly after the Bethlehem Co.

Mr. DINKEY. In 1900.

Senator PITTMAN. You base some of your rights on the fact that you were induced to go into this business by certain representations of the Government. It seems to me that it would be very material if you could furnish the committee with the details of those negotiations as nearly as possible.

Mr. GRACE. I am free to admit, Senator Pittman, that I am afraid we can not do that, because we lost all of our records in the fire, but you will find—I take it that reports of investigating committees like the Niles Board, or like Senator Tillman's committee, would answer, as being official information; and that point is stated in the Niles report, and we could show you that if you would like to see it.

The CHAIRMAN. Are there any records anywhere? You say you have lost your records; ought not the Navy Department to have some records on file——

Mr. GRACE. I believe the Navy Department should have some records.

The CHAIRMAN (continuing). Showing the correspondence had between your officers and the Secretary of the Navy, or the Bureau of Ordnance, or whoever conducted those negotiations?

Mr. GRACE. I should think it would probably be the Secretary of the Navy, or the Chief of the Bureau of Ordnance; and it would seem to me that there might be something on file to that effect in the Navy Department.

The CHAIRMAN. We will try to have those looked up.

Senator SWANSON. You are aware of the fact, however, that no Secretary of the Navy had authority to do anything otherwise than as he was authorized by act of Congress, are you not?

Mr. GRACE. Certainly; that is just the position that we find ourselves in to-day; but we have to work along in the best way we can, with the Secretary of the Navy, for the interest of the Government.

Senator SWANSON. And he has no authority to bind the Government unless so authorized by Congress?

Mr. GRACE. He has no authority to bind the Government unless authorized. He can not make a contract for armor plate, unless it is part of the naval program, as I understand it.

Senator POINDEXTER. Was William C. Whitney the Secretary of the Navy at that time?

Mr. GRACE. I do not know.

The CHAIRMAN. No; Secretary Tracy was Secretary of the Navy at that time.

Senator POINDEXTER. In 1887?

The CHAIRMAN. No; the beginning of the thing was away back beyond that; Secretary Tracy called on them later to go into this business.

Senator CHILTON. It must have been Secretary Whitney.

The CHAIRMAN. But armor was not used then.

Senator POINDEXTER. I was speaking of the time that the Bethlehem Co. claims that they were called on by the Government to go into this business.

The CHAIRMAN. Secretary Tracy is the man who called on them to do that.

Senator POINDEXTER. He was not Secretary of the Navy in 1887.

The CHAIRMAN. I say Secretary Tracy called on them later.

Senator SWANSON. Well, 1887 is the time when they commenced, as I remember it, the original armor plant.

Mr. GRACE. The Niles report reads as follows on that point; there are only two or three lines of it:

Prior to 1902 the combined full yearly capacity of these two plants, the Carnegie and the Bethlehem Steel Co., was about 10,000 tons a year. During that time, an urgent demand for increased armor made it necessary that both plants be greatly extended; and their plant was then increased to a capacity something over 10,000 tons.

As an illustration of the uncertainty in the case of armor plate, and of the deficiency in the amount demanded—that is, our tonnage for the year—the latest tonnage of the Carnegie and Bethlehem companies may be regarded——

Senator SWANSON (interposing). Will you be kind enough to state the names of the Members of Congress who signed that report?

Mr. GRACE. This report was made to the Acting Secretary of the Navy, Mr. Newberry. I just see that name on it.

The CHAIRMAN. He was in office under President McKinley, was he not?

Senator SWANSON. It was a joint committee.

Mr. GRACE. I will ask your attention to Exhibit B (see p. 8), showing the comparison between the cost of armor to foreign countries and our own, and I would like to bring out the point that there the armor business is negotiated and conducted with the armor-plate manufacturers in the same manner that the United States Government had in vogue with us up to the present administration; that is, they called on the armor-plate manufacturers in joint conference; they discussed all phases of the industry with them; they discussed the manufacturing costs, and those are the costs arrived at in foreign countries; the selling prices are arrived at, based on the cost of manufacture in those countries, to which is added a fair amount to pay the interest on the capital invested; and we all know that the

cost of armor plate in those countries is less, or should be less, than in ours if their methods are efficient on account of their much lower wages to labor.

Senator LEWIS. May I refresh your mind as to this? Did not your company make the representation, based on the facts as you gave them, that in America you were experimenting; that there were large expenses in the undertaking, mainly chemical, and it was a new enterprise; and also that the wages of your people—for a certain form of scientific aid especially—were much more than in foreign countries; and that all those things entered into the necessity for and were the justification of this excessive price, as compared with the price to foreign countries of this armor plate?

Mr. GRACE. But, Senator Lewis, our price is lower than the price in the foreign countries.

Senator LEWIS. At the time that you contracted with Russia at a price below that paid by the United States——

Mr. GRACE. Yes.

Senator LEWIS (continuing). Was that the nature of the statement made by your people as a justification?

Mr. GRACE. Whether that statement was made or not, it seems to me that the basic, fundamental principle of taking that contract at a lower price, as we should view it in our industry, would be that we were seeking a new market, and that in order to enter foreign fields we should have to go there in competition, and severe competition, to get a new customer. Our industry at home was not running more than one-third capacity, and to enter that foreign field we simply went out and dumped the product there. That is the way I view that to-day. That was the one time that the Bethlehem Steel Co. has sold armor plate abroad below the price which has obtained to the United States Government.

Senator SWANSON. Have you sold any in foreign countries in the last two years?

Mr. GRACE. No—perhaps we have; but I do not think we have had any foreign contracts in the last two years. If we have had, it has not been at a price lower than the United States Government prices.

Senator PHELAN. You speak about doubling the capacity. I see in Exhibit B (see p. 8), which you have submitted, that the price charged to Russia is \$368 a ton, and on the next table, Exhibit C (see p. 8), you give what purports to be the cost of production.

Mr. GRACE. I would like to explain——

Senator PHELAN (interposing). The cost of production, in most instances, is less than that price. Do you say there was no profit on the armor involved in your sales to Russia?

Mr. GRACE. No; there was certainly no profit in the price at which we sold that armor to Russia.

Senator PHELAN. That is what I understood you to say. Your selling price to Russia was below cost?

Mr. GRACE. Entirely so.

Senator PHELAN. Is that borne out by these tables that you have submitted?

Mr. GRACE. That is borne out by the tables.

Senator PHELAN. In your testimony given before the committee to investigate the cost of an armor plant for the United States, about

a year ago, you refused to testify as to the cost. Do I understand that you are now prepared to testify as to the cost?

Mr. GRACE. I propose, in a very few minutes, to speak on the question of cost, and I submit these tables for consideration at that time.

Senator SWANSON. As I understand Exhibit B (see p. 8), you have no information in reference to this, except what you obtained from the Naval Yearbook?

Mr. GRACE. Exactly so; other than I can say this, that it confirms our general knowledge of the armor-plate industry in other countries. But I thought I would prefer to use certain facts as compiled by this committee, as being more satisfactory than drawing upon our own ideas unassisted. But they compare very well with what we know those countries are paying.

Senator PITTMAN. I would like to be excused, Mr. Chairman, during the remainder of the morning session, as I have some business on the floor of the Senate. When that is over I will return.

Senator LEWIS. I also will ask that I be excused for the morning hour, Mr. Chairman. There are some matters coming up in the Senate this morning which the Foreign Relations Committee is to take up to-morrow; but I do not believe that those matters will occupy us more than an hour.

Senator PENROSE. You may proceed, Mr. Grace, in your own way.

Mr. GRACE. I am going to discuss now, if the committee will follow me, the question of costs.

We have reported by the Niles Board, as the cost per ton, \$244; I am going to cut out the odd cents and read right down this report; and I will be glad if the committee will ask me any questions—

The CHAIRMAN. You may proceed.

Mr. GRACE (continuing). On the subject of costs. The Niles Board, in 1905, reports the cost of manufacturing armor at \$244 per ton. The Tillman report of 1915 reports the cost at \$262. I should say those costs of armor were comparable and unusually close, when you consider they were made at different times, about 10 years apart, during which time the price of materials, and the price of labor, and specifications, etc., had materially increased. I should say that those two costs are practically the same when you consider those conditions.

The Niles Board reported that, in the event of a plant not running full, it was their estimate that with a plant running but one-half capacity, the cost would be increased by 20 per cent; and running a third capacity, their cost would be increased 30 per cent.

Senator Tillman's committee touched on the question, but did not give any particular figures, but they referred to the fact that the other figures are all based on a plant operated full.

I respectfully submit that these reports give mere shop cost, and do not contain many items that enter into the actual cost of armor, such as administration and general expenses, insurance, and taxes, interest on plant investments, and working capital, etc. I believe it is clearly brought out in those two reports that they made no attempt to cover those important items which the private manufacturer, at least, must include as a part of the cost.

And in the following tabulation is shown the effect of the addition of some of these very real and important items. The depreciation

of plants, although a real addition to cost, is not included below, as it is shown that prices actually received by the manufacturers have not been sufficient to allow anything for that purpose.

Senator PHELAN. You have included the other items, then?

Mr. GRACE. I have included other items.

Senator PHELAN. I said "the" other items.

Mr. GRACE. Yes, sir. In column 2 of that table (see Exhibit C p. 8), we take the condition of a plant operating full capacity, and will use the report of Senator Tillman's committee as being the cost, \$262 a ton. To those figures we must add a cost for administration; and you will note that I place that in our industry at only \$100,000 a year; taxes and insurance at \$45,000 a year; interest at 5 per cent on the investment in our plants—and we have invested in our plant something over \$7,000,000; and interest on working capital of \$500,000, brings the cost of armor, in a plant operating at full capacity, to \$315 a ton. That is, a 10,000 ton plant.

Senator POINDEXTER. That is including all of your interest and taxes, is it?

Mr. GRACE. That is including simply interest on the money which we borrowed, or invested, in that plant, as it exists to-day; not the amount which we have written off.

Senator POINDEXTER. Do you manufacture nothing at all except armor plate?

Mr. GRACE. Yes, sir; but this is in the armor plant only.

Senator POINDEXTER. Do you segregate your taxes and your interest applicable to the manufacture of armor alone?

Mr. GRACE. That is estimated at that figure, as being a proper proportion of our total investment to go against the armor-plate plant; taxes and insurance are a small item, only \$45,000. But the actual investment of \$7,100,000 represent to-day's inventory of our plant.

Senator POINDEXTER. Of your entire plant?

Mr. GRACE. No; of our entire armor making department; that is all.

The CHAIRMAN. Right here, Mr. Grace, is there anything else made in that armor department of your factory other than armor?

Mr. GRACE. Nothing else.

The CHAIRMAN. And you can not use it for any other purpose?

Mr. GRACE. No, sir.

Senator PENROSE. As I understand it, the armor plant department of the Bethlehem Steel Co. is an absolutely segregated proposition, of no use for anything except the making of armor plate?

Mr. GRACE. That is absolutely correct.

Senator PENROSE. And when the Government is not ordering armor plate that very large investment stands idle at a loss?

Mr. GRACE. It does.

Senator PENROSE. It can not be applied to making guns or any other munitions of war?

Mr. GRACE. No, sir.

Senator SWANSON. Mr. Grace, have you kept the books of your company on the armor-plate plant in such form that you could itemize from those books that are kept and on which you base your reports to the stockholders and the directors—or so that you could

give an estimate of all that you have received and all that you have expended for that one item of your business?

Mr. GRACE. That is, as a commercial business?

Senator SWANSON. That is, as a commercial business—the armor plant.

Mr. GRACE. No; we would not have all of that without making up certain figures.

Senator SWANSON. Could you furnish this committee a full statement, showing what has been the cost of your armor-plate business since you started in that business, and the expenses, and what the profits are?

Mr. GRACE. Senator Swanson, these exhibits [indicating] will give us that very information.

Senator SWANSON. But these exhibits are based somewhat on the figures that these committees have found as being the costs, which could not be as accurate as your figures.

Mr. GRACE. Suffice it to say that that information is based on information obtained from the armor-plate manufacturers, or it could never have come so near the figures.

Senator SWANSON. Do the books of your company show exactly what has been the profit or the loss on your transactions, from a business standpoint, in connection with the armor-plate plant?

Mr. GRACE. Not without certain interpolations; no; because we have to make distribution of our general expenses, our taxes, insurance, and items of that kind, because we take all of those and lump them against our general business.

Senator SWANSON. What I would like to have in order to ascertain the general financial conditions of this business, is what your company has found from year to year in its reports to its stockholders, as to the conduct of its business, and as to whether its business had been profitable or unprofitable——

Mr. GRACE. That is exactly what——

Senator SWANSON (continuing). And how your business has been running from year to year in connection with that.

Mr. GRACE. Exactly so, and if the books had been kept in that form, I would be glad to give the information to you, but I have tried to make honest deductions from our cost methods, and I have tried to set them out here [indicating paper in witness' hand]. I am under oath, and it is my object in giving you these figures and the tables, to show you the value of that business to the Bethlehem Steel Co.—it is an honest representation of that business that is contained in these tables.

Senator PENROSE. I think, Senator Swanson, that if Mr. Grace is allowed to go along in his own way, he can answer your question.

Mr. GRACE. But I do want to create the atmosphere that I am willing and anxious to give the committee any information that I can; this is too important a question to us for me to be put in the wrong light about that.

Senator PENROSE. Well, from an examination of the exhibit, I think if you will go on and explain your figures, it will answer Senator Swanson's question.

Senator POINDEXTER. What is your entire capital in the plant of the Bethlehem Steel Co.?

Mr. GRACE. I can not answer that question off hand; I would have no objection to giving the information. The capital of our company is \$15,000,000 preferred stock, and \$15,000,000 common stock, or \$30,000,000 in all, and the bonded indebtedness is about \$35,000,000. I should say, from an accounting standpoint, that our company is about a \$65,000,000 or \$70,000,000 company.

Senator POINDEXTER. That is based on capitalization?

Mr. GRACE. That is based on capitalization.

Senator PENROSE. And bonds?

Mr. GRACE. Yes, and bonds.

Senator POINDEXTER. Well, I included that in the term "capitalization," but have you made any estimate of the actual physical value of the property?

Mr. GRACE. Yes, we have; and that is the actual inventory of the value of our armor plant as it stood at the beginning of the year 1915, approved by the Price-Waterhouse Co. as official auditors.

Senator POINDEXTER. Well, I am speaking of your entire plant.

Mr. GRACE. Oh, yes; we have a similar inventory of the entire plant, of course.

Senator POINDEXTER. What is the entire value of the armor plant?

Mr. GRACE. The entire value of the armor plant is \$7,100,000.

Senator POINDEXTER. Is that based on the capital stock and the bonded indebtedness?

Mr. GRACE. No; that is based on the absolute investment; not as it stands today, but as it stood a year ago.

Senator SWANSON. On the books of the company?

Mr. GRACE. On the books of the company, yes. Now, another very interesting figure in connection with that: Senator Tillman's committee reports that, to build a plant of 10,000-ton capacity will cost \$6,600,000, if a certain class of forging equipment can be used; if that can not be used, it will cost something over \$7,000,000. That is according to the report of Senator Tillman's committee; and that report is about correct. It absolutely confirms the conditions which exist with us.

Senator SWANSON. Does this \$262.79 mentioned on Exhibit C (see p. 8) agree with the estimates that your company makes as to what the armor plate costs them?

Mr. GRACE. Yes, sir; very closely.

Senator SWANSON. What is the difference?

Mr. GRACE. It is certainly within 10 per cent.

Senator SWANSON. Is that 10 per cent more, or is it 10 per cent less?

Mr. GRACE. I should say, dependent on the tonnages which we manufacture, it would be 10 per cent up or 10 per cent down; if we were running our plant reasonably full, I think we could make it, on the basis on which his calculation is made, at a reduction from Senator Tillman's figures; but certainly it would be within a limit of 10 per cent plus or minus.

Senator SWANSON. Well, have you figured the cost of armor plate? Have you made up a statement, since you went into the business of making armor plate, showing the average of what it cost you to produce it?

Mr. GRACE. Yes, sir; that is the figure right here [indicating].

The CHAIRMAN. Please answer this question, Mr. Grace: Has the Bethlehem Steel Co. recently bought any additional iron properties?

Mr. GRACE. Has it bought any additional iron properties?

The CHAIRMAN. Yes.

Mr. GRACE. No; we have bought a little machine-shop company in Baltimore, known as the Dietrick & Harvey Co. Do you mean ore companies?

The CHAIRMAN. No; I mean steel companies.

Mr. GRACE. No; we have bought a small machine shop in Baltimore known as the Dietrick & Harvey Co.; they do not make steel; it is just a machine shop.

Senator TILLMAN. These newspaper statements are erroneous, then, about your having absorbed the Midvale Steel Co.?

Mr. GRACE. Absolutely so.

The CHAIRMAN. The reason I am asking that is that my friend the Senator from Pennsylvania (Senator Penrose) accused me of having made misstatements about that the other day.

Senator PENROSE. Oh, no, not misstatements, Mr. Chairman. I said that I had heard you say in the Senate that the Midvale Steel Co., or the Bethlehem Steel Co., had absorbed the other company, whichever it was, and I said——

The CHAIRMAN (interposing). I said I heard that the Bethlehem Steel Co. had absorbed the Midvale; the little one could not swallow the big one.

Senator PENROSE. Well, that the Bethlehem had absorbed the Midvale, and you said, "I hear" that that had been done, and I am a little deaf, and I did not hear that part of your statement.

The CHAIRMAN. Well, the stenographer got it, and he is deafer than you are sometimes. [Laughter.]

Senator SWANSON. Mr. Grace, what do the books of your concern show that you estimated the cost of the armor plate to be the last year that you had a contract with the Government—the cost to your company?

Mr. GRACE. Well, Senator Swanson, that would have to be, as I say, built up by the distribution of these very important items——

Senator SWANSON (interposing). Now, as a first-class business man, you are engaged very largely in the manufacture of armor plate, and if you wanted to determine whether you desired to continue it or not you would make an estimate for your stockholders and your directors as to the cost of that armor plate and what you are getting for it. Now, what do you consider that it costs you to produce it under the last contract that you had with the Government?

Mr. GRACE. Well, right in line with Senator Tillman's own figures——

Senator SWANSON (interposing). Do you say that it cost you \$262.79?

Mr. GRACE. I should say it cost us \$262.79, but not including those items.

Senator POINDEXTER. Not including those items for general expenses?

Mr. GRACE. No; Senator Tillman's report did not include all our costs.

Senator POINDEXTER. But I understood that Senator Swanson was asking you about all your costs.

Mr. GRACE. If he wants all our costs, I should say \$315.29.

Senator SWANSON. What I would like to know, if you have it—of course if you have not that ends it—is, have you, on the books of your company, a careful estimate made as to the cost of this armor plate to you, as a manufacturer of it; do your books show that?

Mr. GRACE. No, not as to the armor plate product by itself; no.

Senator SWANSON. You mean to say, then, that since 1887 your company has been engaged in the manufacture of armor plate—

Mr. GRACE. Yes, sir.

Senator SWANSON (continuing). And its books do not show that an estimate was ever made as to what it costs the company per ton?

Mr. GRACE. That is just what we have done—

Senator SWANSON (continuing). That is, the cost per ton for its product?

Mr. GRACE. That is just what we have done, made an estimate of that?

Senator SWANSON. Well, what I would like is to have you furnish that estimate, that you have been making from year to year, for your stockholders or directors, of that cost, when these contracts with the Government were made.

Mr. GRACE. That estimate, Senator Swanson, as I have said corresponds—

Senator SWANSON (interposing). Would you object to furnishing this committee with the estimates that you have made on your books, showing the cost to you of armor plate since 1887?

Mr. GRACE. I can not give you anything better than this cost shown here [indicating]; that is what this tabulation is for.

Senator SWANSON. I would like to have an opportunity to determine whether those figures are correct or not.

Senator PENROSE. Those figures are from the books?

Mr. GRACE. These are from the books.

Senator POINDEXTER. I understood you to say that that tabulation is from Senator Tillman's report.

Senator SWANSON. As I understand you, those figures could not be taken from your books, because that is an estimate based on the figures arrived at by Senator Tillman's committee, \$262.79 a ton?

Mr. GRACE. That is correct.

Senator SWANSON. Now, you take that figure, and add to it what you think ought to be added for additional costs.

Mr. GRACE. What must be added to it?

Senator SWANSON. Now, your company did not have the benefit of Senator Tillman's figures in order to keep its books and to do its work as a business concern. What I would like to have is a statement as to what your books show that your company, as business men, figured your cost of production to be on armor plate.

Mr. GRACE. I will say this, Senator Swanson, that, on comparing Senator Tillman's report, my conscientious belief is it will be within 10 per cent of those figures, depending upon how you are running your plant. We absolutely can not tell what armor is going to cost us when we vary in output from no tonnage a year up to 8,000 or 9,000 a year, in an exceptional year.

Senator SWANSON. In 1914 you furnished to the Government 16,256 tons?

Mr. GRACE. No; that is the contract that we took in that year, and it has not all been shipped. Now, we can use that as an estimate,

and we can use the previous year as an estimate; and that is exactly what we have done in making up this statement.

Senator SWANSON. Could you make up a statement and furnish it to the committee, as to what that armor plate cost you to produce in 1914, to fulfill that contract of 16,256 tons, at \$425 a ton; that is, the estimate of what it cost you as shown on your books; that is the estimate that you would naturally make, as a business man, so that your directors and stockholders could determine whether this contract was profitable or not?

Mr. GRACE. Well, I could——

Senator SWANSON (interposing). In the previous year, you had a small tonnage.

Mr. GRACE. Yes, sir.

Senator SWANSON. Now, can you make an estimate, as a business man, from your books, as to what you think the cost of that production was?

Mr. GRACE. I certainly can; and that is what I have done. When I say those are the figures that I have used, in Senator Tillman's report, I say that that is as near as I can estimate the figures in making that contract; that the cost varies with the production and the hazards of the business—and when I say the hazards of the business, I may mention that in 1915 the armor furnished the Government required 15 ballistic tests; and we have had to make 22 ballistic tests to have armor accepted; and then have lost a complete group, 600 tons of armor, because we did not meet the ballistic test. Taking into consideration those uncontrollable elements, our estimate would coincide—the best one that I can make—within 10 per cent of what Senator Tillman's report states.

Senator SWANSON. Let me ask you this question: When you get the pay for those 16,256 tons of armor plate, you receive so much money for the Government?

Mr. GRACE. Yes, sir.

Senator SWANSON. Now, do you not charge up to the armor plate every item chargeable to this production, overhead expenses, etc.?

Mr. GRACE. No, sir.

Senator SWANSON. Do not your books show to what extent that contract is profitable or unprofitable?

Mr. GRACE. No, sir; I have got to arrive at an armor-plate cost in our method of accounting, by estimating; I have got to make estimates, as I have made here. I do not know absolutely that we have got every dollar that we have spent in making armor included; I can not locate every dollar in our costs.

Senator SWANSON. What I wanted to know was, could you furnish the committee this information: When you make these contracts, and complete them, do your books show all items of cost and all items of receipts, and thus enable you to strike a balance showing to what extent your armor-plate business has been profitable or unprofitable?

Mr. GRACE. They do not.

Senator SWANSON. They do not?

Mr. GRACE. Only as estimated and deducted.

Senator SWANSON. Does not the rest of your business show such a separation of business?

Mr GRACE. No, sir.

Senator SWANSON. Does not your steel business show that?

Mr. GRACE. No, sir.

Senator SWANSON. You run it all together, do you?

Mr. GRACE. We run it all together; those items there that play such an important part, we run them all together.

Senator SWANSON. So that your estimate is more or less a conjectural estimate as to the cost?

Mr. GRACE. Yes, sir; naturally it must be estimated.

Senator SWANSON. There is nothing on your books that will show exactly what the cost was and exactly what the profits were?

Mr. GRACE. Nothing; our judgment will be from an estimating point of view, and a knowledge of the character and quantity of the work; from the figures, in any case, in executing any armor plate contract, no.

Senator SWANSON. Have you any objection to having a public accountant going through your books, and thus enabling this committee to see what your books show as to the cost of armor plate from 1887 to the present time?

Mr. GRACE. I have no objection to a public accountant, properly authorized, and in whom we would both have confidence, being allowed to go over the situation.

Senator SWANSON. You would not have any objection to the selection of an accountant, agreed on between the Government and the committee and yourself, to go through your books and try to ascertain from those books themselves what this cost and the profit would have been?

Mr. GRACE. As I view it to-day, I would have no objection, unless our board of directors would have some objection; I do not object, because that is the thing I am trying to put before the committee——

The CHAIRMAN. Do you not remember that when the committee was in Pennsylvania, about a year ago, you absolutely refused to permit the Navy Department to send its expert up there, so that he could go over the books with your expert?

Mr. GRACE. I did; and I would refuse to accept that condition to-day, when we have before us a competitor trying to put us out of business. I think it is the logical position to take.

Senator POINDEXTER. Who is that competitor?

Mr. GRACE. The United States Government.

Senator PHELAN. But you are willing to waive that objection now?

Mr. GRACE. I am willing to waive that objection if we agree on a public accountant.

Senator PENROSE. He still objects, and properly so, from his point of view, to the Government sending its employees——

Mr. GRACE (interposing). And Senator Tillman's investigation at our plant took a form of confidential manufacturing information. In addition to the questions of cost, they had a line of well prepared questions, which if we had answered them, would have given away all of our development secrets in the art of making armor plate over a period of 29 years; I do not think we should be called upon to give away our business secrets to a business competitor.

Senator SWANSON. Well, that objection could not exist in the case of an expert who would simply go through your books to ascertain

the cost, as you have made it out yourself on your books, in the production of this armor plate for the Government—the Krupp side armor plate.

Mr. GRACE. I am saying, Senator Swanson, that I would be glad to try to reach an agreement by which a public accountant could be sent up there. I do not think it would be fair for you to ask me to allow a Government accountant to go through our books, with the idea of seeing what he could get out of them. I would be glad to have a public accountant examine them.

Senator SWANSON. Well, this committee is not investigating the process of manufacturing armor plate; that would have to be left to experts. But what this committee is interested in is, whether those profits that you have been making on the Government contracts are excessive, and whether the Government ought to go into the business for itself and save those profits. Now, we say that the best way to ascertain that is to ascertain the cost as arrived at by the people that are engaged in the business, as shown on the books of this company, for the information of their stockholders and their directors, to enable them to ascertain whether the business is profitable or not.

Senator POINDEXTER. I understood Mr. Grace to say that he did not have any such information on his books.

Mr. GRACE. We positively have not a return cost of any product which we manufacture.

The CHAIRMAN. In other words, you have never made up your books sufficiently to learn the facts for yourselves?

Mr. GRACE. No, sir; only in an estimating manner.

Senator SWANSON. But have you got those estimates that you made on the books?

Mr. GRACE. Why, they are right here, Senator Swanson. [Indicating paper in witness' hand.]

Senator SWANSON. Those figures could not be on your books, for the simple reason that those figures are based on what Senator Tillman's committee found the cost to be, \$262.79.

Mr. GRACE. You say on our books? No; because we make no distribution of those costs to any particular product.

Senator SWANSON. What I would like to have is your bona fide business estimate as to what the cost of this armor plate has been to you; your estimate as a business man.

Senator POINDEXTER. Those figures are right here in these tables.

Senator SWANSON. No; those are based on Senator Tillman's estimate of \$262.79; if that estimate is correct, then I think, based on that, these figures are correct. Now, Mr. Grace has just stated that there is a difference of 10 per cent, which would be about \$26 a ton, more or less; he says sometimes it is less and sometimes more.

Mr. GRACE. That is quite likely. Senator Swanson, may I ask this question—it might be interesting; it might throw some light on your particular question: Where did Senator Tillman's committee, and where did the Niles committee, get the information from which they deducted their cost for manufacturing armor plate?

Senator SWANSON. I do not know. What I would rather have than their estimate is, the estimate of business men, when they meet as directors, as to what your cost is in this business; and whether it is wise to continue it? That is, the estimate of business men who

are looking to have the business make a profit. That is what I would rather have than these conjectural estimates.

Senator CHILTON. May I ask a question? What do you manufacture at your plant—how many different things? Guns and what else; how many different things do you manufacture?

Mr. GRACE. I can give that information; it would be quite a big list: Guns, projectiles, complete ammunition, fuses, cartridge cases, rails, structural material, armor plate, bars of all classes, iron castings, steel castings, brass castings, pig iron—practically a full line of steel products.

Senator CHILTON. A great many of the things you manufacture are made from the same kind of steel; is that not right? You buy your steel in quantities, or your iron, or whatever you use, or what process do you go through?

Mr. GRACE. Well, there are a number——

Senator CHILTON (interposing). What is your raw material for your plant.

Mr. GRACE. We control, in the main, our own raw material supply.

Senator CHILTON. I did not ask who controlled it, but what it is? Is it ore?

Mr. GRACE. That is the basis of the steel industry, yes; ore and fuel.

Senator CHILTON. Are there processes, then, from raw material to finished products, which are common to all the finished products?

Mr. GRACE. No; there are different processes of steel manufacture for the different products.

Senator CHILTON. What I mean to say is this: Do you take your ore that is being made into guns and treat it differently from the ore that you make into projectiles?

Mr. GRACE. Very differently.

Senator CHILTON. Very differently?

Mr. GRACE. Yes, quite differently.

Senator CHILTON. Then it is a different process?

Mr. GRACE. It is a different process.

Senator CHILTON (continuing). From raw material to finished product it is a different process, that used in manufacturing armor plate, from that used in manufacturing guns or projectiles?

Mr. GRACE. Very different; and for that reason the armor plate industry is a highly specialized one, and the equipment is only adapted to that particular industry; it can not be used for other products.

(Thereupon, at 12 o'clock noon the committee took a recess until 2 o'clock p. m.)

AFTER RECESS.

The committee reassembled at the expiration of the recess.

The CHAIRMAN. Mr. Grace, will you proceed with your remarks?

TESTIMONY OF MR. EUGENE G. GRACE, PRESIDENT OF THE BETHLEHEM STEEL CO.—Resumed.

Mr. GRACE. We were discussing the question of cost, and I do not know whether I have quite satisfied Senator Swanson or not as to the basis on which these figures are compiled.

Senator PENROSE. I wish you would have the stenographer make a record of the Senators present.

Mr. GRACE. From the figures we have on the cost situation——

Senator SWANSON. What we want is your own estimate of cost, as disclosed by your books.

Senator PENROSE. I suggest the calling of the roll of the committee.

The CHAIRMAN. The roll will be called.

(The clerk of the committee thereupon called the roll, and the following Senators answered to their names: Senator Tillman (chairman), Senator Swanson, Senator Penrose, Senator Chilton, Senator Lewis, Senator Pittman.)

Mr. GRACE. Senator, in answering your question, to the effect that you wanted a cost which would be developed from our own books, I might say this—and I think possibly it will answer what you want—these figures are directly developed from information which we have given to the investigating officers and people in authority on this subject. I have personally placed in the hands of representatives of the Navy Department the results as taken from our own returns, but I do not want you to infer from my statement that we have definitely a complete cost of armor, because we have not; but from our own books, and as closely as we can deduct them, we have arrived at these figures, and for that reason I am assuming actually to take the respective committees' reports as being as close an estimate as we can make, because we have helped and furnished information to the best of our knowledge, in the collecting of these figures.

In the Niles reports he cites eight different instances of costs which are developed, and then says this board's reports are so-and-so. Those respective reports are from officers located at the respective plants, and in our instance the officers were closeted with our auditor going right over our books.

Senator SWANSON. You mean the Army?

Mr. GRACE. The Navy auditors were with our own officers and our own people who are familiar with the methods by which we keep our costs, and extracting from them the cost and arriving at the figures as closely as we could.

I am honest in my statement in saying that we are certainly within 10 per cent of the estimate as given here by this board, and it occurred to me that in that way, through the investigation through these officers, through the two boards, that we could not use better information to develop our cost on, as it gives this as near as we can give it.

If that is not satisfactory, we are willing to go into it and keep on going into it until we can satisfy you, because our disposition is to let you have anything we have, but I can not say that we have a clean-cut cost, because we have not, nor have we a clean-cut cost of any one of our products. We can not get it in a multiplicity of items as we have, because the items must be distributed, and we distribute those over the value of our respective products.

Senator PENROSE. In other words, Mr. Grace, as I understand it, you do not keep a separate set of books for guns or munitions or your armor, but for the general business of the Bethlehem Steel Works?

Mr. GRACE. Certainly so.

Senator PENROSE. And in trying to ascertain the cost of any particular branch, like armor, you have to segregate it by the best deductions you can make?

Mr. GRACE. We take every item of cost which we can take out or directly apply against those products, and then we have to supply the others by the best judgment we can exercise.

Senator PENROSE. And these figures have been elucidated, as a result of conference with the naval officers and representatives of the Government?

Mr. GRACE. Entirely so. And, as I say, I have personally placed in the hands of chiefs of bureaus, in the hands of chief inspectors, the best representations of our cost which we are able to deduct from our Bethlehem works, and that is the result of these respective figures submitted in these reports.

Senator POINDEXTER. You have plants at different localities?

Mr. GRACE. Not armor plate plants; that is all at Bethlehem.

Senator POINDEXTER. But for different purposes?

Mr. GRACE. Ship building plants and car building plants.

Senator POINDEXTER. For instance, the ship-building plants. Just illustrate where you have your ship-building plants?

Mr. GRACE. At Quincy, Mass., known as the Fore River Ship Building Co.; the Harland & Hollingsworth Co., at Wilmington, Del.; and the Union Iron Works, at San Francisco.

Senator POINDEXTER. Do you know what it costs to build a ship?

Mr. GRACE. We would know what it would cost us in building a ship by making a division of our overhead expenses against the respective ships.

Senator POINDEXTER. I am not asking you what you would know, but, do you know, as a matter of fact?

Mr. GRACE. Only on an estimated basis, Senator, because you have got to divide up the general expenses against the particular jobs.

Senator POINDEXTER. Do you know what the net profits of your Fore River Ship Building plant are?

Mr. GRACE. Yes, sir.

Senator POINDEXTER. As distinguished from the rest of your works?

Mr. GRACE. Oh, yes, they are not confused that way. I am only treating of the Bethlehem plant, in which our armor plate is manufactured.

Senator POINDEXTER. The armor plant is not a separate plant?

Mr. GRACE. No; not in its entirety.

Senator POINDEXTER. You make a number of things there.

Senator PENROSE. It is all one great establishment, practically under one roof, distributed over a few miles but all the Bethlehem Works.

Mr. GRACE. In the part set aside for armor plate we manufacture nothing else in that.

Senator POINDEXTER. In the same building?

Mr. GRACE. In the same building, with the same equipment.

Senator POINDEXTER. If that is the case, how did you segregate the capitalization which you gave us this morning?

Mr. GRACE. Because we inventoried our plant, and that is the exact inventory.

Senator POINDEXTER. All the same plant, under the same roof.

Mr. GRACE. Oh, no; it is not under the same roof; it is within the same confines, and we manufacture other products adjacent to it.

I think I can explain myself: You take a central power station supplying the Bethlehem Steel Co. It supplies the armor plate plant as well as gun shops, munition plants, rail mills, structural mills. We have to assign a proportion of that power plant as a proper investment against the armor plate plant.

Senator PENROSE. Mr. Grace, as I understand it, this seven odd million dollars of investment was arrived at through an expert accountant; did you not say that?

Mr. GRACE. That particular——

Senator PENROSE. They are not your own figures; they are an accountant's figures?

Mr. GRACE. They are set up on our books as actual inventories and pass the approval of expert accountants. Of course, we have got to give the expert accountants assistance, to show where we spend our money and how we have spent it for respective equipment. You take our inventory: The value we show here of our plant, and it is in line absolutely with Senator Tillman's value of an armor plate plant.

Senator PENROSE. These figures are the result of a public, licensed accountant's work, employed by you to ascertain them?

Mr. GRACE. Yes, sir.

Senator PENROSE. And not of your own employees?

Mr. GRACE. They are the value of that plant, as owned by its stockholders and bondholders whom we are responsible to through our accountants for a proper accounting of their business.

Senator SWANSON. Let me ask you this question, if it is the proper time. You take so much steel that you put in armor plate, and you produce that steel at another plant of your concern. Do you charge up to the armor plate account that steel that you obtain from another part of your plant, and do your books show that?

Mr. GRACE. It will show it as a part of our general steel production.

Senator SWANSON. Do you carry it on your books as charged, that product, to the armor plate part of your plant?

Mr. GRACE. Only, Senator, for estimating purposes, just the same as we use it in making this up.

Senator SWANSON. Simply for estimating purposes, and books are not kept to find out whether each of the different parts of your plant are profitable or unprofitable?

Mr. GRACE. Only as we make our own division in those respective departments and apply them against their different products; that is all. Take power, for instance, as distributed throughout a big establishment like ours. We simply have got to say, "Well, about so much of the cost of running that power plant applies to armor plate; about so much of the running of that power plant applies to rails, and about so much of that power plant applies to structural material."

Senator SWANSON. Do your books show how that is charged, or simply for estimating purposes of your concern?

Mr. GRACE. We do not arrive at a return cost—I use the words "return cost" on armor plate—only as estimated. That is all we can do. Any more on armor plate than we do on any one of our

products. We aggregate them at the end of a period, take off all the expense of operating the plant, and then we can tell what we are making in our entire plant; and then if we want to know the value of any particular product we must do it according to our estimates in operating that particular plant.

Senator POINDEXTER. Then the sum and substance of it all is that you are only approximating the cost of armor per ton?

Mr. GRACE. I should say it was a very close approximation, because we have been in the business now 29 years. It has been investigated by technical experts from the outside, as well as our own knowledge and experience in the business, and I think we are pretty close to what we are doing.

Senator PENROSE. But, in addition, this approximation, so-called, has met the approval of naval officers and Government representatives?

Mr. GRACE. All investigations have set up very close to our own figures, Senator, and they have certainly had enough talent on it and sufficient opportunities to investigate it, in cooperation with ourselves.

If we had separated, or were it possible in running an organization like ours to have separated our armor plate cost, definitely known as such, we would be only too glad to supply it, but we are trying to supply as nearly that as we know; that is our object.

I would like to refer, then, to column three and that same deduction. There is the situation which has existed throughout the 29 years of the industry; deducting our costs on a basis of running one-third capacity, would show a total cost of \$499 a ton.

The fourth column is in line with the present thought or possible program. What would be the result, taking facts and figures which we have before us, what would be the return cost, operating for the next five years on a program which has been advised, or which has been more or less under consideration for national defense purposes, over a period of five years?

Senator SWANSON. Take the \$100,000 for administrative and general expenses—what is that \$100,000 composed of?

Mr. GRACE. That \$100,000 would be composed of the costs of your general officers, like your president, your vice presidents, your auditing department, your secretary's department, your treasury department, your legal department—departments of that kind which are not set up against particular manufacturing costs.

Senator SWANSON. What do you include in the labor that goes into this \$262?

Mr. GRACE. That includes the making—I think I can make that clear by saying that includes all expenses inside of your works.

Senator SWANSON. Inside the works?

Mr. GRACE. We could put it that way, expenses of labor and otherwise inside of the works.

Senator SWANSON. What part of the general administrative expenses of your concern have you assigned to armor plate—of \$100,000?

Mr. GRACE. I think the general expenses of our concern run about \$1,500,000. We have taken a very small item of \$100,000 as representing the cost of general direction of our armor-plate department.

Senator SWANSON. In your armor-plate plant this makes a difference of \$10 a ton. You mean this is for the addition of salary of president, vice president, and secretary? You do not include the superintendent, do you?

Mr. GRACE. The superintendent is in the \$262.

Senator SWANSON. Two hundred and sixty-two dollars?

Mr. GRACE. Yes, sir; all costs in which Senator Tillman's board and the Niles Board include their costs. This is not in that.

Senator SWANSON. You mean the salaries of your preident and superintendent?

Mr. GRACE. Not superintendent—president.

Senator SWANSON. I mean president, vice president, and secretary—\$100,000 a year for your armor plant?

Mr. GRACE. General expenses of all kinds, yes; selling organization, for instance. We have to sell this armor plate; it costs us money to sell it.

Senator SWANSON. How much do you charge up to the selling part of your armor plate?

Mr. GRACE. We have not made a detailed separation to that extent, Senator; we have not made that.

Senator SWANSON. It seems to me there is very little expense to that. You simply came over here and saw the Secretary of the Navy and had a conference with him and divided up what is fair. It does not seem to me that compares with the other features of your business, going all over the country.

Senator PENROSE. That is a minor item, of course.

Senator SWANSON. \$10 per ton. I would like to see how the items of that are composed. Could you segregate that some way and let us see how you reached a conclusion that \$10 ought to be added for that?

Mr. GRACE. Would it not seem that \$100,000 was rather a small item for directing an investment of \$7,000,000 for general officers? It is purely an estimation.

Senator SWANSON. For general officers for directing that?

Mr. GRACE. General officers of all types.

Senator SWANSON. One thing impresses me in connection with your armor-plate plant and the people who run it: It seems to me that very high salaries are paid your president, vice president, secretary, and those sales agents.

Mr. GRACE. Oh, yes.

Senator PENROSE. You have sales agents in Europe, occasionally, of course.

Senator SWANSON. That could not be included in this.

Mr. GRACE. That could not be included in this. It has been quite a feat to sell armor, even to the United States. It has taken quite a lot of time for the general direction of our accounting departments, our auditing department, and our legal department.

Senator POINDEXTER. Let me ask you to explain what you mean by "quite a feat" selling it to the Government, and that it takes a lot of time. What do you do in that connection?

Mr. GRACE. The development of specifications is an extremely difficult matter.

Senator PAGE. And that goes into overhead charges?

MR. GRACE. Oh, yes. That is just one item. We would never have developed to where we have in the armor-plate industry if it had not been through very close relationship with the United States Government in the developing of specifications to govern the manufacture of armor. We are continually in consultation with your Navy Department; it is absolutely necessary. It is important from their standpoint and important from ours.

SENATOR PENROSE. Mr. Grace, do you have to bear any of the expense of these tests of armor plates?

MR. GRACE. If a test fails, we have to bear the expense of retesting; but that is all provided for and taken care of in the \$262 item, because that is directly a manufacturing cost.

SENATOR PENROSE. Oh, yes.

MR. GRACE. You take our item in there, Senator Swanson, of interest on investment. We are certainly modest in asking for only 5 per cent to carry an investment. It is hardly conceivable that we can go out and borrow money at that figure to build up an industry, which has only shown us in 29 years a return of $1\frac{1}{4}$ per cent on that investment. We never paid our interest, and we have provided nothing for a sinking fund on the bonds for retirement. The principal is of no value at all. The logical question would be, how can we ever afford to stay in the business when our return cost shows in excess of our selling price. That is very simple, because it has been associated with the general steel industry, which has carried our armor-plate business, and manifestly with \$7,000,000 invested in our plant to-day we can afford to take armor below our cost; if we can make anything above manufacturing cost which will go just that little toward helping carry the plant.

SENATOR POINDEXTER. What does your plant consist of?

MR. GRACE. Our plant would consist of large forging presses——

SENATOR POINDEXTER. What does it consist of?

MR. GRACE. What does it consist of?

SENATOR POINDEXTER. Yes—the armor plant?

MR. GRACE. It consists of large forging equipment, large melting-furnace equipment, large machine-tool equipment, tempering furnaces; and consists of an investment of \$7,100,000.

SENATOR POINDEXTER. These tempering furnaces are used for tempering steel for various purposes, I suppose?

MR. GRACE. No, sir.

SENATOR POINDEXTER. You have tempering furnaces?

MR. GRACE. For this department alone.

SENATOR POINDEXTER. For armor plate alone?

MR. GRACE. For armor plate alone.

SENATOR POINDEXTER. How many tempering furnaces have you?

MR. GRACE. I could not say in detail, but certainly fifteen I should imagine. That is all on record here. I do not want to guess at those things.

THE CHAIRMAN. Mr. Grace, if you were to run your plant at its maximum capacity and turn out every pound you could make, how much could you make in a year?

MR. GRACE. I should say between ten and twelve thousand tons, conservatively. A great deal depends on the character of armor, but on the present character of armor, we can manufacture a thousand tons a month.

Senator PENROSE. Ten thousand tons you have got here in your paper.

Mr. GRACE. This is based on a 10,000-ton plant, but on the present character of armor we can manufacture 12,000 tons a year; and that plant cost us \$7,000,000 to do that.

I want to refer to this particular situation, in that item of \$7,100,000 is not included any expenditures for equipment, which has become obsolete, and which we have had to throw away, and we have not had money out of the industry to set up for depreciation purposes against obsolescence of that kind.

Senator PENROSE. What I am driving at is, you estimate you have invested \$7,000,000?

Mr. GRACE. Yes, sir.

Senator PENROSE. And that you could make 11,000 tons or 12,000 tons?

Mr. GRACE. Yes, between ten and twelve thousand tons.

Senator PENROSE. Working three shifts?

Mr. GRACE. We have to work three shifts.

Senator PENROSE. Three shifts?

Mr. GRACE. That is, running our shifts full, three shifts in 24 hours, meaning three shifts of 8 hours each; that would represent our maximum capacity to-day.

Senator PENROSE. Mr. Grace, you have referred to obsolete apparatus or machinery. That is a very considerable item, is it not, on occasions.

Mr. GRACE. It is a very large item. We made one write-off of a forging plant which had to be discarded.

Senator PENROSE. I remember, 25 years ago when I was up there with Mr. Joseph Wharton, that I saw a big hammer which cost a half million or a million dollars.

Mr. GRACE. That is the one I had reference to. It had to be thrown away.

Senator PAGE. Does it go into junk?

Mr. GRACE. It was thrown away for scrap purposes. We can not use it for any other manufacturing purpose.

Senator PENROSE. Did that hammer cost a half million or a million dollars?

Mr. GRACE. That hammer, with equipment, cost about a million dollars.

Senator PENROSE. And you actually never used it at all—it was obsolete before it was finished?

Mr. GRACE. After a very few months the process changed, and we had to abandon it and put in a more modern class of machinery.

Senator PENROSE. I remember that very distinctly, and I was very much impressed with it at the time.

Mr. GRACE. We had to throw away an entire illuminating-gas plant, because that was the original method of cementing of armor.

Senator PENROSE. How much did that cost?

Mr. GRACE. I would not know. It was quite an item, naturally. We to-day have to put in a 10,000-ton forging press on account of the increased size of armor plates. That will cost us one-quarter to a half million dollars. We are staying away from it as long as we can.

The CHAIRMAN. Are there any tunnels between your armor plant and the navy yard at Philadelphia?

Mr. GRACE. Any tunnels? No; but a good double-track railroad.

The CHAIRMAN. I am talking about the difficulty of transportation.

Mr. GRACE. You mean tunnels on the railroad?

The CHAIRMAN. I mean tunnels on the railroad.

Mr. GRACE. No. There is a way that we get to Philadelphia without going through tunnels; that is all right.

Senator SWANSON. Mr. Grace, you said when you used to make contracts with the Government, under the old system, you, with the old Carnegie Company, your competitors, would meet the Secretary of the Navy and discuss the cost and what was the fair profit, and then it would be divided more or less between the two companies, to keep the various plants operating.

Mr. GRACE. That is right.

Senator SWANSON. What was the agreement between you and the Secretary of the Navy as to what was a fair profit for you to make per ton on this armor?

Mr. GRACE. They arrived at a selling price of \$420, Senator, and against that selling price of \$420 they had this very same exhibit of cost that we are referring to to-day. It is exactly what was before us then, within a very reasonable percentage.

Senator POINDEXTER. \$262?

Mr. GRACE. Yes; right in that neighborhood.

Senator SWANSON. \$262, with the additions you have made here?

Mr. GRACE. We also make those additions; of course, we have to.

Senator POINDEXTER. Did you make reductions when the contract was larger or smaller, as to whether you would run one-half, one-third, or entire time, in these agreements with the Secretary of the Navy?

Mr. GRACE. We have taken our medicine through good and bad. When they gave us less than 2,000 tons a year we would not talk price; when they would give us more we did not talk price. We took the good with the lean. We would be entirely disposed, and would be very glad to put the industry on a sliding scale basis, depending on the amount of armor which is given us a year; that would be a fair and equitable way to do it.

Senator SWANSON. How did you reach a conclusion between the gentlemen at this conference as to what was a fair profit on armor plate?

Mr. GRACE. I do not know that you could exactly say that, Senator, just what would be recognized as a fair profit. It seems to me that is a live question to-day. It is in the hands of different people. I should like to see those people say what was a fair profit.

Senator SWANSON. What were the conclusions reached at that conference as to what was a fair profit per ton?

Mr. GRACE. None, I should say.

Senator PENROSE. Is it not true, Mr. Grace, that that is rendered somewhat difficult by the reason of the fact that this is an art which is rapidly improving every year, and obsolete equipment has to be thrown away, and to a certain extent it is a good deal of a "gamble"?

Mr. GRACE. Very much so. You take our experience this last year, which I tried to bring out this morning, where we ought to have

passed armor with thirteen ballistic tests; that is, Government tests for the armor we have made this year.

We have had to make twenty-two tests to pass armor, and in that procedure we lost an entire group of armor, because we could not pass the test. The specifications are becoming severer, and we, not being able to meet them satisfactorily——

Senator SWANSON. As I understand it, Mr. Grace, if you were working at full speed and all the time, the estimate you arrive at is \$350 per ton?

Mr. GRACE. \$315.

Senator SWANSON. Per ton. If you only work one-third, it is \$499 per ton?

Mr. GRACE. That is right.

Senator PENROSE. Do you not think the method that has been recently adopted for letting bids to competitors, so they can be in full operations all the time would give better opportunities for the Government to get cheap armor than it would under the old system, under which all of them would work half or a third full?

Mr. GRACE. No; certainly not; that is, if you mean the entire tonnage would be given to one concern. What would the other concern do that did not get any armor?

Senator SWANSON. I am looking at the interests of the Government. As I understand it, you can construct for a great deal less if you bid for the entire product?

Mr. GRACE. That is all right.

Senator SWANSON. Than if you worked one-half or one-third?

Mr. GRACE. Correct; those premises are correct.

Senator SWANSON. As I understand it, the Secretary of the Navy, Mr. Daniels, has let these bids to the lowest bidder?

Mr. GRACE. Correct.

Senator SWANSON. Consequently, with all that is offered, you would work your plant all the time, would you not, if you got all the armor plate being constructed, and under those conditions it would enable you to construct armor plate at the lowest prices; that has been the reason the Government has pursued its plan of asking bids for the entire amount?

Mr. GRACE. Oh, yes.

Senator SWANSON. With the opportunity to run your plant all the time, does not that give you the minimum cost of production, when you operate in that way?

Mr. GRACE. If we could run our plant full capacity it would give us the most economical operation, but it is rather hard to conceive that with three plants similarly equipped, and probably operated with about the same efficiency that it is going to be possible for any one plant to enjoy all the business of the United States Government, and I should hope that the United States Government would not consider it a good policy to give all of their business to any one plant, if they want a real national defense situation existing at home.

Senator SWANSON. Would you prefer bidding for 10,000 tons, the full capacity of your plant, and run it at the full capacity with all these overhead charges, than to simply have a portion work one-third or one-half?

Mr. GRACE. I would prefer to run my plant at full capacity, but I would not prefer to have the United States Government put the

armor-plate business on a highly competitive basis, because I would then know I could not run my plant some years.

Senator SWANSON. That would be the survival of the fittest policy?

Mr. GRACE. That would be the survival of the fittest policy, yes; and that is just the reason that somebody's fingers would get burned.

Senator SWANSON. The survival of the fittest policy would give the best armor plate, finally, for the defense of the country?

Mr. GRACE. I question that. No; that would not develop the best quality of armor. The present basis is calculated to give the best quality of armor.

Senator SWANSON. The quality of armor is established by the Navy Department, anyway. You have got to make it up to their requirements, and it must pass their tests; and, as I understand it, they have their inspectors to pass it, do they not?

Mr. GRACE. They do.

Senator SWANSON. And when you satisfy the inspectors you then get acceptance, and, consequently, if it is properly inspected and proper specifications have been provided, there is very little opportunity for any fraud.

Mr. GRACE. You well qualified that remark by saying "proper specifications," because it certainly would not be proper if specifications were prepared which were impossible of being met. We have got one situation like that to-day. We have a condition placed upon us in the matter of armor-piercing projectiles which it is now impossible to meet at Bethlehem.

The CHAIRMAN. You bid for a contract you can not fill?

Mr. GRACE. We have taken contracts from the present Secretary of the Navy's administration with the assurance that our product would pass his specifications under which we are to-day accruing penalties at the rate of \$25,000 a month because we can not make the product to meet his specifications. Is that a good, logical, common-sense, business situation to be created in this country? We have not been able to pass an armor-piercing projectile for the United States Government for large-sized projectiles for the last two years because we have a specification which is impossible for us to meet. We have gone our very length; we have spent all kinds of money, and we are to-day accruing penalties at the rate of \$25,000 a month, and we can not see our way out at all. Is that a proper condition to exist?

Senator SWANSON. It depends. If they can not do what the Government wants them to do for all their purposes, it is useless product for the Government that can not accomplish the purpose; and if they make specifications to get projectiles that will be effective and they can not be obtained, I see no use of having projectiles that are useless. It depends upon whether they are useful or not.

Mr. GRACE. But it could be conceived that their specifications are so high that there is no knowledge in the art that will enable us to pass them. During this same period we have had competitive tests with foreign projectile makers and Bethlehem products have stood No. 1 on the list—at the top—notwithstanding the fact that we can not reach the present United States specifications.

Senator PITTMAN. Did you know that at the time you secured the contract?

Mr. GRACE. We took it on the supposition that the Government had conducted certain experimental tests and their saying our product would pass—"you are safe; take the contract." And we took it.

The CHAIRMAN. What are you going to do about it?

Mr. GRACE. I do not know, Senator; I wish I did.

Senator SWANSON. Is what you complain of material to the effectiveness of the projectile?

Mr. GRACE. Due to the defectiveness of the projectile?

Senator SWANSON. I say, is it material for the effectiveness of the projectile—is the projectile ineffective unless these requirements are measured up to?

Mr. GRACE. No; the requirements are too high, unnecessarily high; higher than I know of in any other country.

The CHAIRMAN. Are you under any forfeit?

Mr. GRACE. Are we under any forfeit?

The CHAIRMAN. Yes.

Mr. GRACE. We have not run up the white flag yet, but it looks very serious when I say we have not been able to pass one under two years.

The CHAIRMAN. You know what Carnegie did under similar circumstances?

Mr. GRACE. No; what did he do?

The CHAIRMAN. He got the President to remit the fine.

Mr. GRACE. I hope we will be similarly successful, and I believe we should be, when we are up against an impossibility.

The CHAIRMAN. I mean President Cleveland.

Mr. GRACE. He was a good Democrat.

Senator PENROSE. I would like to make one observation, because I have talked to a number of Secretaries of the Navy. Their policy, as I understand it, has been to invite everybody who is willing to go into the armor plate industry, and to keep them reasonably occupied, and this work is divided up among these concerns on the same principle, I think, Mr. Chairman, that we sometimes insert in the naval appropriation bill—"Not more than one battleship could be built on the Atlantic seaboard" or "In one shipbuilding yard"—following the policy that it is to the interest of the Government to keep the yards on a good basis for making battleships. That is the same policy that dictates the keeping of the Midvale, Bethlehem, and Carnegie companies all more or less occupied, so that the Government will be able to mobilize these munition plants when needed.

Senator CHILTON. Is this your idea to be conveyed by some of your answers that were made in a general way, that it will result detrimentally; for instance, that if the Government should give all its work to the lowest bidder, and the one that could make the most efficient projectiles, for armor plate, that the others would go out of business, and thereafter the Government would be at the mercy of the one?

Mr. GRACE. That is one of the theories. But it seems to me this Government can not afford to establish any policy which will not be for the development of the best quality of ordnance—its guns, its projectiles, its armor plate. It would manifestly, seems to me, answer itself. That two or three or four independent organizations, working in the same line, stand better chances of developing the industry from a quality standpoint than one plant concentrated on it.

Senator CHILTON. And would they be in a better position to make more armor plate, and furnish the Government more efficiently, in case of war, if you had several than if you had one?

Mr. GRACE. Yes; because you will have all those capacities, where you will only have one capacity otherwise.

Senator PENROSE. That is a very important point in the emergency of war.

Mr. GRACE. The creation under that plan of an armor-plate plant of any sizable capacity—of the size which they have been investigating—would more than serve the entire requirements of the United States Government. I can not conceive, with a Government armor-plate plant built and in operation, that a private plant can be continued in any direction. You take the history of the Washington Navy Yard in gun building. They went into gun building in competition with privately owned gun-building shops. What happened? The navy yard runs full and any excess goes to the private manufacturer. It is not encouraging the building up of manufacturing facilities, which is certainly one of the greatest assets that this country could have for its national defense program. We can not exist if a Government armor-plate plant is constructed; we have got to take our \$7,000,000 and throw it away.

Senator SWANSON. Does your armor-plate factory engage in any other feature excepting making armor plate?

Mr. GRACE. Not at all, Senator.

Senator SWANSON. Nothing else?

Mr. GRACE. Oh, we have made a few armor-plate vaults.

Senator SWANSON. The Government is really the only purchaser of the product of this armor plate plant?

Mr. GRACE. We have only one purchaser, and a purchaser without a policy; that is how hazardous it is.

Senator PENROSE. You do not know but what during the next two or three years you may make nothing?

Mr. GRACE. Yes; but we are really in hopes of developing a continuing program. We have said consistently that any governmental official body can come to us and say, "This is the armor we want over a period of five years; you can be sure of this amount which we will contract with you to produce." We are naturally in a position to talk a lower price than under a no-policy program.

The CHAIRMAN. You have seen the estimate under the new program that is adopted by the Congress?

Mr. GRACE. You have sent us a forecast.

The CHAIRMAN. I have it here, and I will have it inserted in the record. This is prepared by the Navy Department—plans and specifications for proposed battleships and cruisers.

(The document submitted by the chairman is here printed in full as follows:)

MEMORANDUM FURNISHED BY THE NAVY DEPARTMENT.

Approximate amount of armor required for five-year program.

| | Tons. |
|------------|---------|
| 1917..... | 26,600 |
| 1918..... | 17,000 |
| 1919..... | 21,800 |
| 1920..... | 26,000 |
| 1921..... | 21,800 |
| Total..... | 113,200 |

Mr. GRACE. Mr. Chairman, I would like to make a statement of this kind: If you will take the present selling price of armor, at \$425 per ton, and our average business of 3,300 tons a year, the total selling price of that armor is \$1,400,000. I respectfully submit that if the whole selling price were profit we would get but 20 per cent return on the plant investment, which must represent interest charges, depreciation, and profit, if it cost us nothing to make the armor, if the whole item of selling price were profit.

Senator PAGE. Mr. Grace, you say that every year you have to put in, or very frequently you have to put in, some of your plants as junk. Is there any reason to believe that if the Government owned its own armor plant that it would not, from year to year, in order to keep up with the time, have to put a goodly percentage of its plant in junk?

Mr. GRACE. They most certainly would go through the same process, their plant would become obsolete, and they would have to replace equipment, on account of advancement in the art.

Senator PAGE. And if they should have your experience—that is, that what they throw away amounts to nothing more or less than junk—it has no value in any other business?

Mr. GRACE. It would have to be thrown away as junk, I am positive of that, Senator.

Senator PITTMAN. Mr. Grace, you have here in your estimates of cost up until 1905, \$244.27 a ton; and then after that \$262.79 a ton. Do you think that is about right?

Mr. GRACE. I should think that they are very close, for this reason, that there is a difference of 10 years in the report of those two committees. Since that time we have had increased cost of material, labor, specifications, and so forth, and I should say that those two returns are approximately the same, when you reflect upon the time that they were each made.

Senator PITTMAN. Is the cost of transportation higher?

Mr. GRACE. The cost of transportation higher? Why, yes; it costs us more for local transportation.

Senator PITTMAN. The transportation of raw material costs you more?

Mr. GRACE. Oh, yes; I should imagine freight rates are higher to-day than they were in those days.

The CHAIRMAN. Whose plant is the largest in capacity, Midvale or Bethlehem?

Mr. GRACE. Bethlehem.

The CHAIRMAN. Bethlehem makes more than Midvale?

Mr. GRACE. Yes; Bethlehem can make more than Midvale. I would say possibly our rating would be in the neighborhood of 12,000 tons to Bethlehem; 10,000 tons to Carnegie, and possibly 7,500 tons for Midvale.

The CHAIRMAN. Seventy-five hundred tons is the maximum capacity of Midvale?

Mr. GRACE. That is just my general knowledge of it, but the Midvale representative is here. Mr. Dinkey is here; I would like for him to answer that question.

The CHAIRMAN. Mr. Dinkey, are you willing to answer that question?

Mr. DINKEY. Certainly. Our theoretical capacity—these things change a great deal, depending upon the kind of armor we are working upon—is 7,500 tons a year. There are additions that are being considered, and which, when finished, will bring that plant up to 10,000.

Senator SWANSON. They are the only three plants in the country making this product?

Mr. GRACE. They are the only three plants in this country that make that product.

Senator SWANSON. Mr. Grace, is there much loss in the construction of armor plate, in the process of manufacture, as rejections?

Mr. GRACE. If we were successful in passing every test, Senator, from the steel ingot, where the steel is first applied in form for making armor plate we get a yield of between 40 and 45 per cent in plate from the steel ingot. If we did not lose any plates or any groups in the course of manufacture, that is about our return.

Senator SWANSON. But, what are the losses that are rejected; average approximate loss on account of not measuring up to tests?

Mr. GRACE. For instance, we lost during this last year—I think we had 13 groups, and we lost 1 complete group. That is $7\frac{1}{2}$ per cent absolute throwing away of good armor, because we could not meet the test. Then, we are all the time losing individual plates which will not measure up to our standard. We put the real inspection on the plate. We will throw the plate away ourselves if we have any doubt that it will not pass ballistic test.

Senator PENROSE. What are the accidents, Mr. Grace, that happen to a plate in manufacturing?

Mr. GRACE. You can lose it at its very conception; you can lose it at the beginning in its composition, if you miss getting the proper composition in the furnaces. You can lose it in pouring; you can lose it in stripping; you can lose it in forging—you can lose it any time during the whole course of manufacture.

Senator PENROSE. Mr. Grace, if the Government went into this business, and the private concerns abandoned the work, is it likely that the Government could obtain the trained people, like yourself, who have started from the earliest beginning in armors, and would there be any assurance that the art would develop like it does in private hands? Do you think it would develop in the hands of the Government?

Mr. GRACE. It is my thorough belief that any process in the hands of one person does not get the competitive features essential to the development of the quality of that process that does exist when it is in the hands of more than one party.

Senator PENROSE. But could the Government get the trained iron masters—metallurgists—to participate in this work for the salaries the Government pays?

Mr. GRACE. I should not imagine so, judging from the salaries paid throughout the service, if that is what you mean?

Senator PENROSE. Yes.

Mr. GRACE. I can not imagine that they have in their organization to-day sufficiently trained steel metallurgical experts to make armor, and, bear in mind, that every armor-plate plant in existence in this country is combined with a large steel manufacturing plant, which brings that armor-plate industry immediately in possession of all

knowledge—metallurgical knowledge and otherwise—in the art of making all grades of steel.

The CHAIRMAN. Mr. Grace, I see Mr. Barba here. Is he connected with your concern?

Mr. GRACE. No, sir; he is with the Midvale plant.

The CHAIRMAN. I know he was at Midvale once.

Mr. GRACE. He is still there.

The CHAIRMAN. Are you connected with Midvale now, Mr. Barba?

Mr. BARBA. Yes.

The CHAIRMAN. When we were up there I asked you this question [reading]:

When Midvale first bid on armor and got the contract, and then President Roosevelt arbitrarily divided it with Carnegie and Bethlehem, was Midvale prepared to manufacture all the contract?

Mr. BARBA. They were willing at that time to accept the whole 16,000 tons.

Mr. BARBA. I remember that perfectly.

Senator PENROSE. I remember it very well, too. I was there. So was the Secretary of the Navy there.

Senator SWANSON. Mr. Grace, to what extent——

The CHAIRMAN. Let us get this point out.

Mr. BARBA. Come along with your question, Senator.

The CHAIRMAN. What did you propose to do if your capacity is only 7,500 tons?

Mr. BARBA. In the first place, the armor manufactured in those days was very different from the armor manufactured now. We were a new and young concern. We were willing to take that 16,000 tons and extend our facilities, which were then only being installed for the first time, to make the entire contract for 16,000 tons. In addition to that, please remember that ships were not built in those days with the speed that they are now. We did not have 30 months or 34 months periods for the completion of a ship at that time, and we had every confidence that we would be able to manufacture the 16,000 tons by the time the ships were ready to take the armor. To-day we are manufacturing our 7,000 tons ahead of the requirements of the ships, and I can show you correspondence from the shipyard asking us to send them no more armor, that they could not store it on their dock.

The CHAIRMAN. So the Government is getting armor faster than it can use it?

Mr. BARBA. Yes, sir. Last February the United States Government, through the Chief of the Bureau of Ordnance of the Navy, asked us to hold completed turrets on the *Nevada* for four months, because they did not want them shipped. They paid us our accounts and we simply held out on that for months.

Mr. GRACE. Your present contemplated program, Senator Tillman, would take but two-thirds of the present armor-plate capacity in the country, and I can make this statement without any hesitation: That there has never been a serious delay in any naval program on account of scarcity of armor.

The CHAIRMAN. Yet, Mr. Barba, in that very same testimony, said that if the Government could enter upon any such program they would make a material reduction.

Mr. BARBA. I said so; yes, sir.

The CHAIRMAN. That they could afford to make it.

Mr. GRACE. We are saying the same thing, if you will give us a continuous program over a period of years.

The CHAIRMAN. Let us come down to something practical. I do not see much benefit from this investigation, except Senator Penrose's benefit.

Senator PENROSE. I am sorry the committee has not been more enlightened; I have been greatly enlightened.

The CHAIRMAN. I have been all over it two or three times, and therefore it is old to me.

Mr. GRACE. We are trying our best, Senator.

The CHAIRMAN. The armor factories are represented by you three men—Carnegie, Bethlehem, and Midvale, who are "doing business at the old stand," as I said in my speech the other day—what are you prepared to propose to the Government provided this program we are now suggesting entering upon is enacted by Congress, these 113,000 tons, which I have just shown you in a memorandum sent around to the members of the committee?

Senator PENROSE. That may depend on the specifications, to some extent.

The CHAIRMAN. These are the specifications prepared by the Navy Department.

Senator PENROSE. But the Navy Department has not issued the specifications of the character.

The CHAIRMAN. They have been already planned, and the ships are being drawn to scale; they have estimated. This was prepared by the Navy Department at my request, so that we might know just how many tons of armor we would require in order to have these gentlemen here informed of what we want them to do.

Mr. GRACE. Senator, can I reserve the reply to that until a little bit later—until two or three more points are brought out, then I shall be glad to answer it?

The CHAIRMAN. I shall be pleased to have you do that, if you do not overlook it.

Mr. GRACE. Then I shall be glad to say what I think in reference to that program.

Senator PAGE. This program amounts to about 7,000 tons each for the three plants, if carried out, per annum.

Mr. GRACE. Oh, yes. In other words, it represents about two-thirds of the present existing capacities, and I would like to reserve my comments on how I think that could be satisfactorily handled between the Government and the present armor-plate manufacturers, until we make a couple more points.

I do not think there is any question about the quality of armor that the United States Government is receiving. They have a higher specification than any foreign country that we know of to-day. We are manufacturing, in other words, armor plate to the highest specifications. You take England, for instance. They make an armor plate, submit it to the Government, and if it is satisfactory the Government says, "Make the rest like that plate." We make 600 tons of armor in a group and submit the whole group to the United States Government, and they select the poorest plate out of it, to the best of their knowledge.

The CHAIRMAN. How can they select the poorest plate?

Mr. GRACE. They have their representatives in our plant at all times. Every process is open to their inspection, and they soon become expert in the knowledge of what is good and bad.

The CHAIRMAN. Does not the English Government have inspectors on the grounds?

Mr. GRACE. They have inspectors on the ground, but that inspector says, "Yes, that plate is being made like the one which you submitted," and it passes test. We have got to make all of ours, submit them, and then the one which is supposed to be the poorest is taken, and that has to pass the prescribed ballistic test. It is quite a different matter.

And it occurred to me along the line that if this industry was controlled absolutely by the United States Government you would have the purchaser inspecting its own products and accepting it for use. I can not quite conceive that they would be as rigid with themselves in making condemnations as they are with the private manufacturer.

I think if you will refer and ascertain about some other processes and the manufacture of some other commodities for the Government you will find that it has transpired where specifications have been practically ignored.

The old contention that the United States Government does not have to include in its cost overhead expenses, interest on plants, etc., I submit is not quite correct, because, I believe, the United States Government has to pay for its Attorney General's department, for its auditing department, for its Treasury Department, its financing—and I can not quite conceive that they could add an industry worth \$10,000,000 to their present outfit without having to increase those departments, at least absorb a part of that expense.

The private manufacturer has stood all the expense of developing the industry over the last period of 29 years. We got our first start by paying for information from European manufacturers. But, in its development in this country, the United States Government has not stood the cost of developing this product. The private manufacturer has stood it.

We have a concrete example before us, in addition to the armor piercing projectile we have just spoken of, of what it means to plant equipment. Both the Navy and the Army are submitting to us to-day new gun designs, which require our spending hundreds of thousands of dollars in the increasing and putting in new equipment, rather of a more modern type, if we are able to manufacture the guns that the United States Government are now asking us to make. That is a concrete example right before us now of what it means in obsolescence of plant.

The Government has had experience in assembling plants—I mean in assembling materials into a finished article. The Government has not had experience in the producing of steel. The armor plate industry is a producing industry, not an assembling industry, and that is where our other line of experience in general steel making is of great assistance to the development of the art.

Senator PENROSE. I should be glad if you would explain, in a couple of words, what you mean by "assembling."

Mr. GRACE. You take a Government shipyard, for instance, they buy the finished product, they buy the steel products, and they assemble them; they buy steel plates, and form them and build

their ships; they buy steel castings and assemble them, and build their ships. But they do not make steel; they have had a sad experience in attempting to make steel castings, so we understand.

Is it a valuable asset to the United States Government to have private capital invested in the manufacture of all ordnance materials, and ordnance products? I think, maybe, that question answers itself.

I am ready now to answer the chairman's question. In column 4 of our cost statement——

The CHAIRMAN (interposing). On what page?

Mr. GRACE. On Exhibit C, column 4 (see p. 8) of the cost statement gives the return cost on the present proposed program; the program as outlined by Senator Tillman, of 113,000 tons of armor, in the next five years, would mean the operating of our plants at two-thirds capacity. I have inserted that condition in column No. 4, Exhibit C, to indicate what that cost would be. In that cost, we have included interest on bonds and interest on working capital. We have no item for depreciation of plant; we have no item of profits. I submit that our selling price to-day is \$425 a ton, and this cost, if we were assured of that program, is \$367 a ton.

I should like to meet with this committee, or any representatives of the Government, with properly invested authority, and agree on a five-year program for armor plate; and I believe that we can satisfy them as to the price. I will say that we are prepared to give a substantial reduction in the present selling price of armor, if we can be assured of that condition existing over the next five years, because we can afford to do that, rather than being put out of existence. A Government plant is bound to shut our plant up. We have invested over \$7,000,000 in the plant; it would become worthless. Before we would go to that end, we naturally—if it is deemed proper, if it is deemed right; if the authority handling the armor plate business of this Government, after presenting our case like we have; after we have been frank to tell exactly the returns we have gotten; if the people handling that business for the Government do not feel that the present price of armor is fair, we are willing to meet with them and try to make a compromise.

We do not believe it is necessary to go to the point that Senator Tillman does not hesitate to say that it would pay to build a Government plant, even if they locked the doors with a view of controlling the price of armor.

If the history that I have given you to-day indicates that the private manufacturer has attempted to take advantage of the United States Government, by exorbitant prices on armor, by raising the prices, and continually raising them, that would be a different thing; but it shows, on the contrary, that the prices have gone down; and we are to-day selling to the United States Government cheaper than any Government in the world is buying armor for, even where the Government itself has embarked in the business; and I can not quite conceive that a statement of that character is fair to people who have tried to do what is right, to people who have tried to cooperate with the Government, and who have put their money in a plant, in cooperation with the Government; and to have legislation passed which would make our entire investment valueless does not

seem quite right, without at least trying to let us exist, and exist on a fair basis. That is all I am asking for; I simply want a chance.

Senator SWANSON. In this estimate that you have submitted, on Exhibit C, that if you work at your full capacity, the cost would be \$315.20 a ton, do you include there 5 per cent profit on your plant investment, and working capital?

Mr. GRACE. No; we only include 5 per cent interest, the carrying charges on that investment.

Senator SWANSON. Well, I say, that is a profit on the capital invested?

Mr. GRACE. No.

Senator SWANSON. Now, would 10 per cent be considered a pretty good amount of profit on the amount of capital you have invested in this business?

Mr. GRACE. You see that includes only money invested—that is a carrying charge.

Senator SWANSON. No; as I understand you put \$7,500,000 in your plant?

Mr. GRACE. That is right.

Senator SWANSON. And you have got \$500,000 working capital.

Mr. GRACE. Yes, sir.

Senator SWANSON. That is \$8,000,000.

Mr. GRACE. That is right.

Senator SWANSON. Now, if you get 5 per cent on that, and include it in the cost, that is 5 per cent on the investment, is it not?

Mr. GRACE. That is what we have to pay.

Senator SWANSON. Then, if you have not paid that, you have no capital invested, and hence ought not to make anything, except for the risk you are running. But what I mean is, if you put \$8,000,000 in that plant, and then charge 5 per cent interest on that \$8,000,000, that is a profit of 5 per cent on the amount invested in the plant?

Mr. GRACE. That is 5 per cent on the capital invested, but how are we going to pay that capital back?

Senator SWANSON. Well, I say that is 5 per cent profit on that capital invested, is it not?

Mr. GRACE. It is not a profit; it is paying back what I have got to pay back.

Senator SWANSON. Then, if you have got that capital, and if you pay it back, you would have no capital invested after it is paid back?

Mr. GRACE. Would you buy a 5 per cent bond, and be satisfied with a return of 5 per cent on it, and not have any assurance that your principal is good, that you are going to get your money back?

Senator SWANSON. Well, if I can get 5 per cent eternally on that bond, it would be 5 per cent interest on that bond. But as I understand, these are not bonds which have been issued; this is the money that you put up for capital.

Mr. GRACE. They are absolutely bonds; we have \$30,000,000 of bonds issued.

Senator SWANSON. You issued the bonds for this \$8,000,000 that you put into this plant? Your bonds are issued for that?

Mr. GRACE. That is right.

Senator SWANSON. Now, you charge that up; then what capital have you got in this plant? Nothing but the bonds issued; nothing but debts.

Mr. GRACE. We have \$8,000,000 that we have obtained from the disposition of those bonds to build our plant.

Senator SWANSON. Well, if it is not capital, you simply borrowed that amount of money to go into this business?

Senator PENROSE. And every railroad does the same thing.

Senator SWANSON. The railroad has to put some money up in stocks; of course, in many instances, they simply water it; but from what I can understand, if you put \$8,000,000 of capital in, and then borrow \$8,000,000 more, you have then got \$8,000,000 capital and \$8,000,000 bonds.

Mr. GRACE. But I have not done that.

Senator PAGE. The bonds are the capital.

Senator SWANSON. Yes; then, I say, the bonds are the capital.

Mr. GRACE. Surely.

Senator SWANSON. Then, all the expenses of your bonds that you have to pay, and everything, are included in that \$315.29 a ton shown on Exhibit C?

Mr. GRACE. Suppose I have come to you and borrowed \$8,000,000 for my plant.

Senator SWANSON. Then, what would you consider your profit, if you had no capital in it?

Mr. GRACE. First of all, I am buying those bonds.

Senator SWANSON. No; I say, you have just issued \$8,000,000 of bonds and you have got no capital stock?

Mr. GRACE. Yes, sir.

Senator SWANSON. And suppose you were to make \$1,000,000 of profits. What percentage of profits would you consider that on the amount of money you had invested?

Mr. GRACE. First of all, I should have to depreciate those bonds against an industry, like the armor-plate industry, at a rate of $6\frac{3}{4}$ per cent a year.

Senator SWANSON. It seems to me, in this case, that it is true that you have got no capital, but you have borrowed \$8,000,000 and invested it in this business.

Senator PAGE. They have to provide for amortization of those bonds.

Senator SWANSON. Of course, the bonds ultimately will have to be retired; but after they are retired you do not own anything?

Mr. GRACE. What are they to be retired with?

Senator SWANSON. With your profits.

Mr. GRACE. We have not any profits.

Senator SWANSON. Well, you are making a profit if you sell armor plate at \$425 a ton, and make it at \$315.29 a ton?

Mr. GRACE. Then, I submit in column 3 of this paper a statement showing—

Senator SWANSON (interposing). And the point I am making is, that if you have \$8,000,000 in this business, and you make 5 per cent, you simply increase that if you are working at full capacity, to 10 per cent, or, if that was the capital, \$35.50 a ton more—I do not know whether it would be any very large return, owing to the uncertainty of industries like this; but it seems to me that that is the money you have got invested; and with the program we have here, it would seem to me that the price now charged, or the \$425 a ton

that you have been charging, gives a pretty high profit on the amount of money you have invested in this business.

Mr. GRACE. Well, take the figures shown in column 4, \$367.82 a ton, against this—

Senator SWANSON (interposing). Well, do you think it is wise for the Government to go to the great expense of equipping plants, running at half their capacity, and pay excessive prices for that work, or to let it out to the lowest bidder, and keep a plant running all the time, and producing at its full capacity and at lowest cost?

Mr. GRACE. Do you think it would be fair for the United States Government to acknowledge that the private manufacturer is entitled to a fair profit?

Senator SWANSON. I think the best way for the Government always is to put things out to the lowest bidder, both in selling and in buying, and I think a great mistake is made when it does not do so. And these things are usually done in that way. I think the best thing for the Government to do in this case would be for the Government to keep a plant running at its fullest capacity and do it much more cheaply, than would otherwise be the case.

Mr. GRACE. If you are dealing with commercial products, that would be all right; but you are dealing with an absolute specialty. You can not keep an absolute specialty in existence unless you give it some work to do; and you would soon find the Government in the hands of a monopoly of one plant, which would charge whatever it wanted to get for the product.

Senator SWANSON. Well, the Government can do in this case as they did in the case of powder, and have their own factory.

Mr. GRACE. Well, you will find that the Government, by going into this new line of business, which is not to be compared to the powder situation, will have an experience similar to that of Japan, which has to pay \$490 for Government made armor, under conditions which are decidedly more favorable than we have in this country; they have, for instance, much cheaper labor in that country. That would be the history of an armor-plate factory if run by the United States Government.

Senator SWANSON. The position I wanted to take in reference to this statement is that I think this does include—that \$35 a ton in column 2 is certainly the interest on the money you have invested in the plant, and is a return of 5 per cent a year on that.

Mr. GRACE. Well, suppose I am going to you to borrow money to build my armor-plate plant; I want to borrow \$8,000,000; you have got to loan me \$8,000,000. What conditions are you going to place on me to protect your money? First of all, I have got to pay you your interest on that, say, 5 per cent; are you going to be satisfied with that and are you not going to insist on my setting aside a fund yearly to make your principal sure.

Senator SWANSON. Well, I am not insisting that there should not be something in addition to that. But I say that your position, that you receive, at \$315 a ton, no return on the money invested is incorrect; you receive 5 per cent on the \$8,000,000 invested, because that is all there has been invested, if your system is right. Now, I am not contending that you should not receive more than that; but I am saying that, to say that \$315 a ton gives no profit and no return on

the money invested is, to my mind, a mistake, because these figures show that you do receive 5 per cent on all that you have invested in that business.

Mr. GRACE. It gives no profit; it gives you the carrying charges on your money invested.

Senator SWANSON. Yes.

Mr. GRACE. But it does not give you any provision for building up funds to retire those bonds.

Senator SWANSON. No.

Mr. GRACE. Nor does it give us any profit for our effort, for our risk in an exceedingly hazardous business, with one customer and no policy.

Senator CHILTON. Are you through, Senator Swanson? If so, I would like to ask Mr. Grace this question: How long would it take to build a plant such as outlined by the Government?

Mr. GRACE. Under present conditions, I should not expect that that plant could be obtained inside of four years, and then it would go through a development, or an experimental stage, for a number of years before they would be making real armor.

Senator CHILTON. Do you think it would take so long as that?

Mr. GRACE. I certainly do. And you can not build your plant under these conditions, under the high prices existing in this country to-day for general steel products—you can not build your plant for anything like the figures we have given for our plant; we could not replace our plant to-day for those amounts. And during all of this period, gentlemen—you take the situation existing this year; we are able to get practically any price that we see fit to ask of a foreign government for these products; but I would like for you to try to find any case during this war where we have added anything to our defined selling prices to the United States Government; the forgings are no higher; the guns are no higher; the armor plate is no higher; and yet we can go to a foreign government and sell those things at anything we care to ask for them to-day.

Now, I do not like the accusations which are thrown at us, that we are always awaiting an opportunity to take advantage of the United States Government. If I accomplish nothing else to-day, I would like to have you understand this: if our plant goes out of existence, I do not want to go out under that cloud, because it is not true.

Senator SWANSON. What do you think if this naval building program goes through—I am inclined to think that this Government is going to have a very large Navy; instead of decreasing it, it looks to me as if, in the course of time there are more chances for increasing it—what do you think you could furnish armor to the Government for, running at your full capacity, with a fair and reasonable profit?

Mr. GRACE. Well, your program would not give us full capacity, to begin with.

Senator SWANSON. Well, suppose your plant was given full capacity, and the other plants would take care of themselves?

Mr. GRACE. I would only ask a fair return.

Senator SWANSON. Well, what do you think would be a fair return per ton?

Mr. GRACE. I tell you that you would not put your money in any manufacturing industry, and I would not go before our board of directors and ask them for money, to develop, in any commercial

line of product, a plant that would show me less than 20 per cent. If I had taken the same amount of money, \$7,000,000, and put it into ordinary steel products, and obtained only 10 per cent profit on it, or put it in a grocery store business, and obtained 10 per cent profit on it, the results, as shown on the last exhibit which I have submitted, Exhibit D (see p. 9), are very characteristic of what would happen.

Senator PENROSE. The next exhibit shows that, Mr. Grace?

Mr. GRACE. Yes, sir.

Senator SWANSON. Well, suppose you get 20 per cent profit running at your full capacity. Now, you make armor at \$315 a ton at your full capacity, and that includes——

The CHAIRMAN (interposing). The Government estimate is that it can run a 20,000-ton plant and make cheaper armor than it can with a 10,000-ton plant.

Senator SWANSON. I know that, but I am asking for his estimate.

Mr. GRACE. I am not talking about a 20,000-ton plant, because we have not had experience with that.

Senator SWANSON. I say, at \$315 a ton, and on that basis you make, if my estimate is correct, 5 per cent on the amount invested, which is \$35 a ton; and if you were to make 20 per cent, that would be—how much more would that be?

Senator CHILTON. \$63.

Mr. DINKEY. \$63.

Senator SWANSON. Yes, \$63, which would be \$378 a ton. Now, at your full capacity, as I understand these figures, at \$378 a ton, you would make 20 per cent on the amount of money invested in this plant?

Mr. GRACE. That is right; we would make 20 per cent.

Senator SWANSON. Now, at the price of \$425, at which armor plate is selling now, what profit would you make of the amount invested?

Mr. GRACE. That would add about 15 per cent more.

Senator SWANSON. That would be 35 per cent profit?

Mr. GRACE. I have not deducted those figures, but I take it that 15 per cent more would be added, at \$425 a ton, if we are running at full capacity. Now, certainly you would not go into a hazardous business of this type, which is highly specialized, where you are apt to lose your plant any minute—which is very evident from the character of legislation that is being talked about, whereby we are likely to lose our \$7,000,000; and we have had this condition to face in several instances before, and I fear that we will lose it some day—you would not feel like making an investment of \$7,000,000 on a 20 per cent basis; we would not go into that business to-day; make no mistake about that.

Senator PENROSE. There is another point: I do not see that these gentlemen give you any assurances of following this program through three Congresses; one Congress can not bind another.

Senator SWANSON. As I understand, they are not feeling any lack of confidence in Congress continuing a big naval program.

Mr. GRACE. I would like to say this, that we are not politicians; we are not Democrats and we are not Republicans. Our plant is built up primarily for making ordnance products. We have got to run our plant, whether the Democrats, or the Republicans, or the Progressives, or the Prohibitionists are in power; it makes no differ-

ence to us; we can not take part in that; we are not down here in Washington lobbying to attempt to influence legislation as to the character or size of the program which you are developing; that is not our business; it is your business to decide what this country needs in the way of ordnance products, and in the way of national defense. We are here to serve you. We have built up the plants. If it is one battleship, it is all the same to us; if it is two battleships, so much the better, as it gives us more business. But we are not down here to try to influence that and I will challenge anybody to say that they have ever seen a representative of our company down here, trying to influence legislation on the question of the size of the naval program. When there is legislation before the Senate of this character, which effects our plant investment, however, it seems to me that I have a perfect right to come down here and talk to our Representatives in Congress, and other people that will listen to me.

Senator SWANSON. I recognize that right, and we are very glad to have the information that you are giving.

Mr. GRACE. Thank you.

Senator SWANSON. I will ask you this question: Will you submit to this committee, or would you think it proper to submit to this committee, a statement as to what you would be willing to furnish the Government armor plate for, for the battleships covered by this program, extending for several years, at your full capacity.

Mr. GRACE. Well, Senator, your program does not give us our full capacity.

Senator SWANSON. It will give you more than your capacity, if you do not feel that you must take care of other people.

Mr. GRACE. No; it would not.

Senator SWANSON. Well, you could not make 21,000 tons a year, could you?

Mr. GRACE. There would be some years that we would not get any contracts, and we have got to reflect that, as to capacity, I have never seen a commercially developed plant, developed with private capital, that goes out of existence, unless the Government, being its only customer, goes into the business. If I do not run my plant somebody else will take it up and run it; that plant is there and is going to get part of this business; if it does not get it this year it will get it the next year.

Senator SWANSON. We would like to know what these plants are willing to furnish this armor plate for under this program to the Government? Senator Tillman asked you that question and we would like to have that information—that is, I would not like for you to give it unless you thought that you could properly do so.

Senator PAGE. Would you suggest that the business is all going to one of these firms, and that the others would be idle?

Senator SWANSON. No; I say let him work to his full capacity in his plant.

Senator PAGE. That means that the other two plants would be idle.

The CHAIRMAN. Well, we are figuring now for the Government.

Senator PAGE. I think you are not, when you provide business for only one plant.

Senator PENROSE. Then, let us have a similar provision as to constructing battleships; let them all be built in one shipyard; let them all go to the Atlantic coast, or to the Pacific coast, or whatever plant builds them the cheapest. But we do not adopt that policy in building ships.

Senator CHILTON. Well, we will not decide that question here, and I take it that we will develop the facts before adopting any policy.

Senator SWANSON. I would like to ask you another question, Mr. Grace, if it will not embarrass you: Do you think, from your experience with the men in the Navy, who are supervising this work, that they are sufficiently equipped to run an armor plate factory?

Mr. GRACE. Not by any means; I certainly do not.

The CHAIRMAN. Mr. Grace, can you explain why they have been able to construct and operate a powder factory then, for smokeless powder?

Mr. GRACE. That is a very different situation; it is a small operation; the knowledge is easily obtained, as to how it is operated; it does not involve the metallurgy of steel, as to which, with all of our ability and experience in the steel industry in this country, we have an awful lot still to learn; we are not anywhere near satisfied with our steel making knowledge to-day. The powder industry is very familiar to a good many men.

The CHAIRMAN. You are, of course, familiar with the facts in regard to powder?

Mr. GRACE. Very familiar.

Senator PENROSE. Mr. Grace, I think the committee would be interested in having a statement from you as to your career and experience as a metallurgist. In what capacity did you begin with the Bethlehem Steel Co.?

Mr. GRACE. As electric crane operator, at 15 cents an hour. That was in 1899.

The CHAIRMAN. Right there, I will take the liberty, if the committee does not object, of inserting an extract from the report of the Secretary of the Navy for the past fiscal year, which just came out two weeks ago, with regard to the cost of powder.

Senator PENROSE. All right.

(The statement referred to is as follows:)

Experience has demonstrated that it has been sound public policy for the Government to be able to manufacture smokeless powder. A few years ago the Government paid 80 cents a pound to the private company from which it purchased its supply. In 1900 at Indian Head the Navy began to manufacture smokeless powder, but not nearly enough for its needs in time of peace. Later, after congressional investigation of the cost of manufacturing smokeless powder, the price was fixed by Congress at 53 cents. The price paid to private manufacturers has varied as follows: In 1897, \$1 per pound; in 1898, 85 cents per pound; 1899-1900, 80 cents; 1901, 75 cents; 1902-1906, 70 cents; 1907-8, 63 cents; 1910-1913, 60 cents; 1914-15, 53 cents.

The CHAIRMAN. The Government used to pay 80 cents a pound for powder, and the cost has been reduced now to 24 cents and a fraction.

Senator PENROSE. What was your next step, Mr. Grace?

Mr. GRACE. I gradually progressed through the various manufacturing departments, in minor capacities, occupying slightly better positions as I would go along. But my experience has been in the plant, in the operations of the plant; and our plant is not operated, for instance, from Wall Street; our plant is run on its merits, on the investment in the plant, and I am not here from a financial institution;

I am here talking from my experience in operating a steel plant, in doing things of a manufacturing character. I am not here talking from a theoretical basis, of what ought to be done, and what should be done; I know what can be done, and what has been done. If that is the line you want me to speak about—of course it is rather embarrassing, because it is personal.

Senator PENROSE. I knew that you would be too modest to want to speak about yourself; but I wanted to bring that out, to show your full knowledge of this business, from the foot of the ladder to the top.

The CHAIRMAN. He was almost born and bred in the business.

Senator PENROSE. Yes; born and bred in the business, and has practical knowledge all along as an operator.

Mr. GRACE. Our factory is run from Bethlehem, I would like to say.

Senator SWANSON. I think the members of the committee are agreed upon that, Mr. Grace.

Mr. GRACE. Our company is not run from New York; our company is run from Bethlehem.

The CHAIRMAN. Mr. Grace, if the Government should unfortunately, from your point of view, decide that it will go into the manufacture of its own armor and establish a plant, do you think it might be possible that the Steel Trust has already acquired and tied up all the raw material—I mean the ore, and everything else, such as limestone; what do you say as to that?

Mr. GRACE. I believe the Government would be able to obtain the necessary raw materials to make armor with.

Senator CHILTON. I can speak of the limestone; they have not all the limestone.

Senator SWANSON. And do you think we would get as good raw material as anybody else?

Mr. GRACE. It would depend entirely on the character of buying.

Senator SWANSON. I say, there would be no discrimination against the Government?

Mr. GRACE. In the main, at present, the manufacturer supplies its own raw material; but the Government can buy those raw materials at a certain figure.

The CHAIRMAN. I know that the Steel Trust has not gobbled up all the raw material, because there is too much in the United States.

Mr. GRACE. Just one word more: Give us a chance before you put us out of existence. Find out what your program is going to be, if you can, and when it is developed. I think I can promise this committee that if they will develop their program we can satisfy them. There certainly is some point where it would not pay the United States Government, even in the most optimistic frame of mind, to build an armor-plate factory; and we will try our best, from a Bethlehem standpoint, to go a long way toward meeting those views, if you will only give us a chance when you are ready. When you are ready to do business, we will see if we can not satisfy you.

Senator PITTMAN. The only thing I am not satisfied with is your statement that the Government officers, or those that the Government could obtain, would not be qualified to engage in this industry. And you say there is a great distinction between armor making and the manufacture of powder?

Now, you will admit that you are not satisfied with the perfection of your steel, and perhaps never will be; the perfection of that steel will depend upon something that you will discover later, will it not—if it is perfected?

Mr. GRACE. We are working on that question of process all the time.

Senator PITTMAN. I understand; that is a question of investigation all the time.

Mr. GRACE. That is right.

Senator PITTMAN. But the steel you are making now is made according to a certain fixed formula, is it not?

Mr. GRACE. It is made according to our knowledge and experience in the making of steel; yes, sir.

Senator PITTMAN. I know; but my question could be answered very simply. It is made according to a certain fixed formula, is it not? In other words, there are so many parts of—

Mr. GRACE (interposing). Yes; but it is a rather long formula.

Senator PITTMAN. Well, I do not care how long the formula is—

Mr. GRACE (interposing). Go ahead, because I am interested.

Senator PITTMAN. Well, I may have to ask that question over again: It is made according to a certain fixed formula, is it not?

Mr. GRACE. Well, let us say, if you mean "process."

Senator PITTMAN. Well, process?

Mr. GRACE. Yes, certainly; we have a well-defined process for the making of armor. I think that answers your question, does it not?

Senator PITTMAN. Process; yes. In other words, every ingredient in that steel is in accordance with a fixed quantity?

Mr. GRACE. Absolutely not; oh, no. That depends entirely on the conditions which exist in the furnace at the time of making that steel.

Senator PITTMAN. You do not have a fixed formula?

Mr. GRACE. Absolutely not; that will vary with the varying conditions as you run your steel out—as you make your steel. You have to have sufficient ability and experience to meet different conditions all through the process.

Senator PITTMAN. Who does that in your works?

Mr. GRACE. Our various experts.

Senator PITTMAN. What office does he hold?

Mr. GRACE. Well, we bring to bear on that the knowledge of the man in charge.

Senator PITTMAN. Well, who is the man in charge? What do you call him?

Mr. GRACE. In melting the steel, it would be the superintendent of the open-hearth department; in treating the metal, it would be in the superintendent of the treating department; in forging, it would be the superintendent of the forging department. Each one would be an expert in this process, as to his own operation.

Now, I would like to go back just one step further, to a question that you say you did not quite understand me to answer. I think the chairman or Senator Swanson asked me if I thought that the ability existed among the naval officers to make armor plate; I said, no; but they did not ask if I thought it would be possible to obtain that ability to make armor plate; you rather inferred that I said, no, it was not possible to obtain ability to make armor plate; whereas I said I did not consider that it exists to-day in the Navy.

The CHAIRMAN. Right there, Mr. Grace, if the Senator will permit me to interrupt, have you not in these various armor-plate factories a good many graduates of Annapolis?

Mr. GRACE. We have a number of Annapolis graduates in our organization who have something to do with the making of armor. But the superintendent, for instance, of any one of these departments that I speak of in the manufacturing process of making armor, is not a naval graduate; they are college men, a lot of them, with a long experience, and are highly developed men; some of them are not college men; some are practical men. But we have in our factory a number of Naval Academy graduates as well as graduates of West Point.

The CHAIRMAN. Why did you get those men?

Mr. GRACE. Why did we get them?

The CHAIRMAN. Yes, why did you get them?

Mr. GRACE. Because we are always looking for efficient and well educated men; and if they are educated in the ordnance business, Mr. Chairman, it is quite logical for us to look——

The CHAIRMAN (interposing). To the best ordnance school in the United States?

Mr. GRACE. Why, of course; we are in the ordnance business, and we like people educated in ordnance, to build up our organization; that is why we have Mr. Matthews, for example.

The CHAIRMAN. Therefore, do you not think the statement made by you is somewhat erroneous, that the Navy does not have men competent to make this armor?

Mr. GRACE. But I say that there is not one of those Navy men in charge of any one of our departments which has to do with armor plate in its manufacture; not that they could not learn to do that, but they would not know it when they came to us; they would have to be taught the respective processes; the details and the various conditions arising.

Senator PITTMAN. Well, this committee that investigated this subject last winter, in making out their report, give in detail in the report the men that are employed inside, the wages and all; and from that detailed statement they have made up the cost of manufacturing armor plate; you have stated that that is practically correct; you have stated that they got this information from you, or partially from you and partially from others.

Mr. GRACE. We helped supply that information.

Senator PITTMAN. Now, when you take the men employed, the inside men—there is a list of them here in this report, upon which the cost was made up.

Mr. GRACE. Yes.

Senator PITTMAN. You have a general superintendent who gets \$15,000 a year, according to this report; you have an open-hearth superintendent who gets \$6,000 a year; you have a forging plant superintendent who gets \$5,000 a year; an armor-treatment superintendent at \$5,000 a year; a machine-shop superintendent, \$4,000 a year; chief engineer of plant, \$4,000 a year; metallurgist, \$6,000 a year; chemist, \$2,500 a year.

With the exception of the first-named officer, the general superintendent at \$15,000 a year, do you think those salaries would indicate

that those men are so unusual and exceptional that they could not be very soon brought from other businesses with success?

Mr. GRACE. Those men can be taught the armor-plate business, if in the employ of an armor-plate manufacturer; yes.

Senator PITTMAN. Are these the men upon whom depend the perfection of the steel plate?

Mr. GRACE. Very largely; because you have listed there practically your leading men in the various departments making armor plate.

Senator PITTMAN. I thought that I had called over the men that you had in the various departments making armor plate?

Mr. GRACE. Yes; they are practically the same men.

Senator PITTMAN. Now, do you mean to say that during all of that process it is left to the judgment of these men to make changes in that process?

Mr. GRACE. No, sir.

Senator PITTMAN. You do not?

Mr. GRACE. No, sir; those men would have no authority to make a change from our well-defined method of making armor, without consultation with the general officers of the company who have that under control.

Senator PITTMAN. Undoubtedly——

Mr. GRACE. But these men will be developing; they will be learning; they will bring to our attention any thought which they may have, or any experiments which we may find that we want to carry out, to see if we can improve our product; it will be put in the hands of those men for execution, naturally, because they are the heads of departments.

Senator PITTMAN. That is what I am getting at.

Mr. GRACE. That is entirely right.

Senator PITTMAN. Those men, then, are merely performing administrative functions?

Mr. GRACE. They are at the head of those respective operations.

Senator PITTMAN. They never attempt to change any function that is laid out for them?

Mr. GRACE. They are men of sufficient experience to meet any change in conditions in the process which they are using in the making of armor. For instance, you take your open-hearth superintendent to-day; your open-hearth superintendent has a heat of steel in the furnace to make armor plate out of. That man has got to use his judgment and his experience in meeting the varying conditions which will arise in making that heat of steel. He does not have to go to the general office with that information; he has got to know it. But if we were to start out, for instance, to change the general process of making our armor plate, that could not be done by department superintendents; it could only be done after a most careful survey, and a weighing of all conditions that exist, and a long series of experiments, to see whether their suggestions were good or bad before they were adopted.

Senator PITTMAN. Well, the Krupp steel process—is that the name of it?

Mr. GRACE. That is the proper name for it.

Senator PITTMAN. That is a patented process, is it not?

Mr. GRACE. Yes, sir; the patent has run out.

Senator PITTMAN. Was the patent on that process the method of treatment of the steel, or was it on a combination?

Mr. GRACE. It was a combination of different conditions.

Senator PITTMAN. A combination of ingredients and conditions?

Mr. GRACE. Yes, sir.

Senator PITTMAN. It was fixed, was it not?

Mr. GRACE. Our process of making armor to-day?

Senator PITTMAN. I mean Krupp—the patented process was a fixed and determined process, was it not?

Mr. GRACE. Not as outlined in the patent papers, no. You could not take the patent information as filed and follow that and make armor plate.

Senator PITTMAN. An expert could not?

Mr. GRACE. No; certainly not.

Senator PITTMAN. Then it was not sufficiently definite——

Mr. GRACE. Not in the patent.

Senator PITTMAN. It was not sufficiently definite so that an expert could take it and find exactly what it meant?

Mr. GRACE. Not as outlined in their patent papers, no; not to my knowledge.

I was going to say we sent our committee of men over to the Krupp plant; we sent our metallurgists—the men who were going to take in hand the work for us. They lived there with their practical people who were using the Krupp method of making armor plate, and that is the way we got our start.

Senator PITTMAN. How many did you send?

Mr. GRACE. I do not know, Senator, it has been so long ago.

Senator PITTMAN. How long did it take them to learn that process?

Mr. GRACE. That was before my time.

Senator PITTMAN. Don't you think that you could pick out officers of the United States Government, those with natural qualifications along that line, and that they would learn just as well as your men did?

Mr. GRACE. Certainly they could in time if they could find the place to learn it. You would not expect us to take them into our own plant, would you, and build up a competitor? That would not be quite fair, would it?

Senator PITTMAN. But you can not use that as an argument, that the Army officers and naval officers would not be able to learn these processes.

Mr. GRACE. That is for this committee to determine. If they can find somebody that will sell the knowledge to them, that is the way they can get it. I am not saying that the United States can not buy it.

The CHAIRMAN. Do you agree that the inspectors that the Navy Department have had up there have learned much about armor plate manufacture?

Mr. GRACE. They have learned some facts about the manufacture of armor, but not sufficiently to direct the manufacture of armor.

The CHAIRMAN. How, then, do they detect any cheating or rascality?

Mr. GRACE. I do not take it that you are accusing us of any of those practices?

The CHAIRMAN. I am only referring to ancient history, about Carnegie and what he did to the Government once. You are familiar with that, I suppose?

Mr. GRACE. I have heard about it.

The CHAIRMAN. And Mr. Schwab was a Carnegie foreman at that time, was he not?

Mr. GRACE. I have never interested myself sufficiently in that to be able to say, because it is ancient history. Nothing like that exists in our industry to-day.

The CHAIRMAN. No; I think not. You have got so rich you do not need to do it any more.

Mr. GRACE. Well, we did not get it out of armor, at any rate. The history of the Bethlehem works would not indicate that we have had an unusually prosperous industry. We paid no dividends from 1907 to 1912. We then started to pay from 5 to 7 per cent on our preferred stock and nothing on our common stock.

Senator CHILTON. You paid nothing from 1907 to 1912?

Mr. GRACE. No, sir.

Senator CHILTON. And you did not commence paying anything until 1913?

Mr. GRACE. In 1913 we paid 5 per cent on preferred stock.

Senator PITTMAN. Mr. Grace, are you satisfied with the \$425 that the Government is paying now?

Mr. GRACE. I am not, Senator, under the program under which we have been operating. No, I do not think that is an adequate return; I do not think it is as much as we ought to have.

Senator PITTMAN. Would you accept a contract at that rate? Would you continue on just as you have been doing?

Mr. GRACE. We certainly would. We would be glad to do it. Further than that, Senator Pittman, if it is necessary for us to reduce that price substantially in order to keep the United States Government from going into the business, if it is deemed wise, we would do that.

Senator PITTMAN. Now, you are working at the present time under column 3 [referring to typewritten statement]; that is, one-third capacity?

Mr. GRACE. That is the average of 29 years; yes.

Senator PITTMAN. And if it is carried to two-thirds capacity in accordance with our present program, the cost would be reduced to you \$132 a ton?

Mr. GRACE. Yes; that is right.

Senator PITTMAN. Would you be willing to give the Government the benefit of that \$132 a ton?

Mr. GRACE. For this \$425? Certainly not. I do not think the Government wants us to do any such thing.

Senator PITTMAN. Here are your comparative figures.

Mr. GRACE. But if we have accepted a condition and have been working under a condition that is manifestly unfair—

Senator PITTMAN. I mean, you would make just as much profit on a two-thirds capacity of \$132 less, would you not? You would make just as much?

Mr. GRACE. I am sorry, but I do not get that, Senator.

Senator PITTMAN. If it costs you, we will say, \$132 less a ton to manufacture when running at two-thirds capacity than when running at one-third capacity, as you are now, then you could deduct \$132, the difference in cost, from the \$425, and still make just as much as you are making now?

Mr. GRACE. No; because you are getting down so low that you are cutting into our absolute manufacturing cost, and we can not absorb

that—our overhead rates on investment in the plant, which we have to suffer, which we have to carry whether you give us any armor-plate business or not. Now, I can reply to that. If I would only make \$1 above Senator Tillman's figures I would have that much to apply against my general expense, would I not?

Senator PITTMAN. But it seems to me you have taken that into consideration in carrying out your fourth column. Your fourth column is carried out here, each item; your general expenses, taxes, and all are carried out and distributed, with the result that the cost, as figured out here, is \$132 a ton less to you by reason of the more continuous operation.

Mr. GRACE. Yes.

Senator PITTMAN. Then if the cost is \$132 less by reason of increased capacity to two-thirds, why could you not give that to the Government and be in exactly the same position you are in now?

Mr. GRACE. Because you are taking it off of moneys which we have to spend to manufacture. You are going back into our manufacturing costs. Now, if you do that you have got us in such a position that if we only make a mere pittance against the investment in the plant it is there. It is no good; it could not be used for any other purpose. If you are not willing to give us a fair return on that investment we have to take anything you will give us.

Senator PITTMAN. Here is \$499 in your second column that you are working under now. That is your cost. In your fourth column it is \$367.82, which leaves practically \$132. In other words, the total cost carried out, including overhead expenses, interest, taxes, and all, is \$132 a ton less when you are working at two-thirds capacity than at the present time when you are working at one-third capacity.

I am simply asking now, if the cost is \$132 less a ton, taking into consideration everything that you have—cost, taxes, overhead expenses, and all—if you gave that to the Government out of the \$425, would you not be in exactly the same position as you are now, working at one-third capacity?

Mr. GRACE. You would double your loss.

Senator PITTMAN. I see partially what your point is there.

Mr. GRACE. It seems to me, in any event, there [indicating on statement] is your cost. Now, there is not any question about this. They are very close to being correct, as nearly as we can estimate them. When our selling price is \$425, that would represent the difference between \$367 and \$425, if we are operating under that condition. Our general steel business has carried our armor plate business; there is no question about that.

Senator PITTMAN. Now, there is another question that has been asked a number of times in the hearings, and that is whether or not when you were first obtaining armor business you did not take into consideration the initial expense of the plant in putting in bids.

Mr. GRACE. I could say, if you will look at the statement showing the prices we got in the early stages and the total tonnage against that price, you will see how far that will go toward paying off your investment. The cost at the beginning of any industry is much higher than when you get into a steady operating condition later on.

Senator PITTMAN. On this other table you found during the first 10 years that it was much lower?

Mr. GRACE. Well, your process is developed, then. I am talking about the first two or three years of going into a business. Certainly, for the first two or three years, when you are getting your process developed, it is much more expensive than when you get into the operating swing.

Senator PITTMAN. In 1887 what was the capacity of your plant?

Mr. GRACE. That was the first plant that was built, and, as I understand it from the old crowd, the plant was originally built for about a 5,000 or 6,000 ton plant.

Senator PITTMAN. Then, you had 5,000 or 6,000 tons' capacity in 1887?

Mr. GRACE. In 1887 we got a 6,000-ton contract, to last six years. Our next contract came in 1893, so we had 7,000 tons for a period of six years.

Take our recent experience, beginning in 1905 and 1906, and look at what we have had. We have had 1,800 tons, 3,500 tons, 3,100 tons, 4,500 tons, 2,200 tons, 2,200 tons. We have taken the bitter with the sweet.

Senator PITTMAN. In your hearing somewhere you have stated that the Government was not carrying on any of its Government enterprises. That statement may be too broad, but that, as a general thing, Government enterprises were not run as cheaply as private enterprises. Is that your opinion in the matter?

Mr. GRACE. Well, it will depend a great deal on the method of cost accounting. If a Government-operated industry would keep its cost on the same basis as a privately directed industry, I should not think it would give as low a running cost for those operations; certainly not.

Senator PITTMAN. For instance, you have a president who is drawing a large salary, and should do so.

Mr. GRACE. Not that he thinks it is exorbitant.

Senator PITTMAN. I did not say exorbitant; I said large, and I said you should. You have other officers—secretaries, vice presidents, and treasurers—who are men that are entitled to good compensation. Now, take the Navy, for instance. We have a lot of naval officers who, in the nature of things, must be more or less idle. Our preparedness scheme probably anticipates that there will be a greater increase in the number of naval officers than in ships or anything else for the time being. Can you not conceive that the Government, having to keep those officers employed, could utilize them and save that much expense?

Mr. GRACE. That is, you would take those men out and educate them as steel makers, so that they could direct an operation of this kind? And at the same time the United States Government has its President, its Vice President, its legislature—which should all be paid for.

Senator PITTMAN. I would undoubtedly, if I had the say about it, take a naval officer and make a useful citizen out of him while he was not fighting.

Mr. GRACE. You can train your naval officers to run your armor plant, if you take enough of them, because they are educated——

Senator PITTMAN. Don't you think it might be a very good policy for this Government to keep those men employed at something practical, where they would be earning something for the United States?

Mr. GRACE. I can not see that it is good policy for the United States Government to destroy its privately owned and operated ordnance plants—and that is what that would mean.

Senator PITTMAN. That is another question. I realize the point you make there, but that is another question. I mean, if it could be done. Say, for illustration, there was a requirement for 10,000 or 20,000 tons more armor plate per year than the capacity of the three companies that now exist, and the United States Government, instead of asking one of you to increase your capacity, would say, "We will build it"—don't you conceive that in time it could utilize its officers to better advantage?

Mr. GRACE. No; I would say it could use them to better advantage in training them for their defined duties for the national defense work.

Senator PENROSE. I want to ask you a question, Mr. Grace, if it will not interrupt the continuity of your statement.

Mr. GRACE. I have finished, Senator.

Senator PENROSE. You have not gone over this last exhibit about the comparison of the armor plate business and the steel manufacturing business.

Mr. GRACE. We spoke of it, and I thought it was put in the record.

Senator PENROSE. I would like to ask you this, Mr. Grace, to complete the record. There is quite a remarkable disparity between the class of armor plate in the United States and the class in Europe. I would like to ask you what the reason of that is. For instance, take England; how many armor plants are there in England?

Mr. GRACE. England has, to my knowledge—and I think it is correct—five concerns, all privately owned, engaged in the manufacture of armor. The English Government does not advertise for bids on armor plate. They bring into consultation their armor plate manufacturers, go over the situation with them, and agree upon what is a satisfactory price.

Senator PENROSE. Do all the manufacturers get the same price?

Mr. GRACE. They all get the same price; it is specified by the Government.

Senator PENROSE. And it is divided up among them?

Mr. GRACE. It is divided up among them according to their capacities.

Senator PENROSE. Why should the English Government be willing to pay \$691 per ton when the American Government only pays \$425, when it is presumed that the English can manufacture cheaper than we do?

Mr. GRACE. I should imagine that they are willing to recognize a proper profit and return on the capital invested.

Senator PENROSE. With the purpose of encouraging individuals and keeping up munition plants?

Mr. GRACE. Keeping up ordnance plants, yes. I guess they have found it a good asset in the last year or two.

Senator PENROSE. If they had not adopted that policy they would have been in the lurch during this war?

Mr. GRACE. I think most likely they would. The same situation existed in Germany. There are two plants there, Krupps and one other, and their business is negotiated in a similar way.

Senator PENROSE. They send for the manufacturer and adjust a fair price on the basis of getting a reasonable product and keeping them in the business?

Mr. GRACE. That is right. France has three plants.

Senator PENROSE. And Russia the same way?

Mr. GRACE. No; Russia has, I think, one plant. I am not clear on that.

Senator PENROSE. Government plant?

Mr. GRACE. Mr. Matthews corrects me and says he thinks there are two in Russia.

Senator PENROSE. Private plants?

Mr. GRACE. Private plants or Government plants—it is rather a mixed situation in Russia.

Senator PENROSE. I suppose Russia also buys some from England?

Mr. GRACE. I think they do.

Senator PENROSE. Then Japan is the only country using armor that has its own Government plant, as I understand it?

Mr. GRACE. That is correct—of any moment, yes. They get their entire supply from a Government plant. There is no private capital invested in Japan in armor-plate works.

Senator PENROSE. They were driven to that course because private individuals were not able or were unwilling to establish a plant?

Mr. GRACE. That is the inference, and that is what we have been advised, that Japanese private capital would not invest in the industry.

Senator PENROSE. Then, all these other governments now engaged in this dreadful war have adopted a policy which we threaten to abandon?

Mr. GRACE. Entirely so.

Senator PENROSE. And had they not done that they would be in the most lamentable condition at the present emergency?

Mr. GRACE. To that end the English Government has indirectly put it within our power to develop large ordnance capacity in this country, showing the need of it at home.

Senator PENROSE. Has the proposition ever been agitated in Germany—which is somewhat of a paternal government—for a Government armor plant?

Mr. GRACE. I have never heard of it. I presume that is the cause of their apparent satisfactory negotiations with privately invested capital.

The CHAIRMAN. Mr. Grace, was it you or Mr. Barba, or who was it, that told me the Krupp Co. and the German Government were one and the same thing?

Mr. BARBA. I told you it was reported, that the German Government was interested in Krupps as a manufacturing proposition, the Government practically controlling their policy with reference to Government supplies.

Mr. GRACE. I wish the United States Government were interested in us. I think it would be a wonderfully strong asset.

Senator PITTMAN. Your statement was that they are only making from 3 to 4 per cent on the investment?

Mr. GRACE. Yes, sir; I wish the United States Government was carrying some of those bonds, if we could separate out our armor-plant investments.

Senator PITTMAN. Is it a possibility that you would sell that plant to the Government—

The CHAIRMAN. If it is such a bad investment, I think he would be glad to get rid of it.

Mr. GRACE. If we could pick that plant up bodily and sell it to the United States Government, with the knowledge that the United States Government was going into the business——

Senator PITTMAN. Is it possible to do that?

Mr. GRACE. No; it is not, because our open-hearth furnaces are with our other open-hearth furnaces; but if we could, we certainly would sell them our plant, and we would sell it for less than it is inventoried here.

Senator PITTMAN. It is almost a separate industry from the rest of your steel plant, is it not?

Mr. GRACE. Yes; but, for instance, you could not buy the power plant, because it is supplied from our central power plant; the steel furnaces are with our other steel furnaces. But if you take the forging, the treatment, the tempering, the machining—all that is distinct and separate. We could sell you that, but that would not give you a complete operating plant. You would have to supply some other units.

Senator PITTMAN. As far as the power is concerned, that is very easily separable, is it not?

Mr. GRACE. You could easily build a separate power plant for it.

Senator PITTMAN. But you could supply the power and charge the Government for it?

Mr. GRACE. Oh, yes.

Senator PITTMAN. Have you ever considered the possibility of selling that to the Government?

Mr. GRACE. Not seriously, Senator.

Senator PITTMAN. Would you seriously consider it?

Mr. GRACE. We would take it up with you. Yes, indeed, we would. Yes, we would consider it.

Senator PENROSE. Mr. Grace, Japan with a Government plant gets its armor, according to the figures given out by this committee, at \$490. Have you any idea of the price of unskilled labor in Japan?

Mr. GRACE. Well, it is a mere song.

Senator PENROSE. Then with the vast difference in the cost of unskilled labor in America and in Japan, the Government armor plant in Japan is unable to furnish the product except at a very considerable price in excess of what we get it for here, showing the incompetence and extravagance—if I may use the word—in government ownership of an armor plant?

Mr. GRACE. That would seem to be the inference.

Senator PENROSE. It is the only inference.

Senator PITTMAN. What kind of armor do the Japanese make?

Mr. GRACE. I think they make Krupp armor.

Senator PITTMAN. Are they manufacturing sufficient for their navy?

Mr. GRACE. Practically so, I understand. I think that perhaps England has given them a little armor, but I have no positive knowledge of that.

Senator PITTMAN. Is that steel made by unskilled labor?

Mr. GRACE. It is ordinary labor, which makes up a fair proportion——

Senator PITTMAN. You were speaking just now about the low price of unskilled labor.

Mr. GRACE. Take any class of labor in Japan, your mechanic or your ordinary laborer, and he is certainly a much cheaper man than we get in this country. Whether he is skilled or unskilled would depend upon the definition of the word. The general scale of wages in Japan is much lower than our own.

Senator PENROSE. I notice from the figures in Exhibit A that the price of armor in nine years has practically remained the same. Of course during that time you have had eight-hour laws, increased wages for skilled and unskilled labor, State law requiring compensation or insurance, and a score of other enactments which greatly increase the cost, have you not?

Mr. GRACE. Yes; the cost of materials, the cost of labor—costs are all up.

Senator PENROSE. And yet during that time, with all this great increase of legislative enactments, you have kept on furnishing armor at the same price?

Mr. GRACE. We have absorbed all those increased costs, and now our base price of armor is practically what it was over a period of 10 years. At the time of the enactment of the eight-hour law we increased our price on the basis of what we figured that would cost us, and the price has gradually come down from that.

Senator PENROSE. Mr. Chairman, I would like to ask Mr. Grace whom he would like to have called on next.

Mr. GRACE. I would suggest Mr. Dinkey, president of the Carnegie Steel Co.

Senator PENROSE. I would like to have a quorum here before we proceed.

Mr. GRACE. I want to thank the committee for being so patient, and I am very sorry we did not have more present.

Senator PENROSE. I suggest that the chairman have the clerk call the roll and see who is here.

Mr. GRACE. Could I add just one word?

The CHAIRMAN. So far as I am concerned, you may add anything you choose.

Mr. GRACE. Within the last few days I saw in the Government Advertiser a statement with reference to the bids for the driving machinery for battleships 43 and 44:

The Navy Department will, under such circumstances, invite bids for the construction and installation of this equipment. The two firms, the Westinghouse Co. and the General Electric Co., are expected to be in the competition, and it is hoped that it will be possible to divide the work so that each concern will obtain an order for the installation on one ship. This will afford an opportunity to encourage the two plants where this type of machinery is manufactured.

That is the plan we have been working under in the armor-plate business. We have been encouraged, and now you are encouraging two other concerns——

The CHAIRMAN. Instead of responding to the encouragement the Government has given you to compete, you have combined.

Mr. GRACE. And they add in this advertisement that they hope the bids will be of a character that they can divide the bids, and it is in the hands of the Government to legislate a fair price for those sales of armor. You do not have to build your plant; agree with

us on a satisfactory price. If you can not do that, legislate yourself what is a satisfactory price.

Senator PENROSE. It is on the same principle as the case where the Government will award a contract for a battleship to the Norfolk shipyard at a higher price than they could have had it built for on the Delaware River, because only one battleship could be built in the same yard?

The CHAIRMAN. You mean the Philadelphia yard?

Senator PENROSE. Put it that way if you choose—in order to keep both yards running in time of need.

Mr. GRACE. Mr. Chairman, you have given us one hard slap this year in not giving us a battleship to build when we were the low bidder. Please don't give us another. We are in the shipbuilding business also.

(By direction of the chairman the clerk proceeded to call the roll of the committee.)

Senator PENROSE. How would it do, Mr. Chairman—I do not think you will accuse me any more of trying to delay this matter—to have this testimony printed and considered by those who have not been able to listen to it? And then I think the thing could be closed up in one more hearing, starting afresh next Tuesday.

The CHAIRMAN. Do you guarantee they will all be here Tuesday?

Senator PENROSE. I will do my best, and meanwhile we can have the testimony sent out to each member. I want a complete record made for the information of the Senate. I think the Senators who have been here should have an opportunity to read it carefully, and a few additional questions may occur to them. I do not know whether that is satisfactory to the gentlemen who are here.

Mr. BARDA. We will be here. We are at the disposal of the committee.

(Here ensued further informal discussion relating to the time of the next hearing.)

Thereupon, at 4.50 o'clock p. m., the committee adjourned to meet Tuesday, January 25, 1916, at 10 o'clock a. m.)

SECOND DAY.

TUESDAY, JANUARY 25, 1916.

UNITED STATES SENATE,
COMMITTEE ON NAVAL AFFAIRS,
Washington, D. C.

The committee met at 10 o'clock, a. m., pursuant to adjournment.

Present: Senators Tillman (chairman), Swanson, Chilton, O'Gorman, Lewis, Phelan, Pittman, Penrose, Clapp, Page, and Poindexter.

Present also: Hon. Josephus Daniels, Secretary of the Navy, and Rear Admiral Joseph Strauss, Chief Bureau of Ordnance, Navy Department.

Senator PENROSE. Mr. Chairman, Mr. Barba was about to proceed, when the committee adjourned, and I suppose he wants to proceed now.

Mr. BARBA. I am ready, if you please, Mr. Chairman.

Senator PENROSE. In view of the presence of the Secretary of the Navy, I would suggest that the committee would be glad to have him ask any questions that may occur to him at any time.

STATEMENT OF MR. WILLIAM P. BARBA, VICE PRESIDENT MIDVALE STEEL CO., PHILADELPHIA, PA.

(The witness was duly sworn by the chairman.)

Senator PENROSE. Mr. Barba, will you state to the committee the company you represent, and your official position in it?

Mr. BARBA. The Midvale Steel Co.; I am vice president.

Senator CHILTON. Where is it located?

Mr. BARBA. Philadelphia.

I thought it might be well, Mr. Chairman, in order to give you something to talk about, to illustrate just what armor is and how it is made. I think I shall take up no more than five minutes of the committee's time, and then we can proceed at once to what we are after.

Here is a piece of the finished product cut and split from the upper barrette—plate No. 3103 of barrette No. 2 of the *Mississippi*, a plate accepted June 8, 1915. This piece does not weigh very much; I have had it cut down to almost nothing. I thought the gentlemen of the committee might be interested in seeing just what armor plate looks like.

This [indicating] is the face that is presented to the enemy. Here is a hard face, so hard it will scratch glass. It can not possibly be machined. In cutting it out we used an oxyhydro blowpipe, which accounts for the split face here.

Back of that is the thick, tough, fibrous back. The face is intended to break the point of the projectile; the back is intended to prevent the broken body of the projectile from shouldering its way through.

Now, to produce this piece—which was cut from a plate that you could scarcely lay down on the floor of this room, so large was it—the material had to be collected and charged into furnaces that are 70 or 75 feet long, the hearths of which are as big as this room. The mass of the metal is one and a half times the volume of this table and weighs probably 60 tons. Two, sometimes three, and occasionally four, of these furnaces are brought together and poured into one ingot, of which this is a photograph.

This ingot (See Exhibit A) weighs 320,000 pounds, and is smaller than is now required to make the port plates for the three-gun turrets we are now manufacturing. After that has been cast and has cooled from 58 to 60 hours it is loaded on a special 200-ton car and carried into a press shop adjoining the foundry where the ingot is poured.

This press shop, I might say, is as big as this entire Capitol building, less 120 feet of length. The press shop is 120 feet shorter than the Capitol Building, it is wider than the entire building, and its stack is as high as the dome. In that building there are but two tools. One is a 3,000-ton press for small operations, and the other is a 10,000-ton press for manufacturing armor, of which this is a very excellent photograph. (See Exhibit C.)

The magnitude of the press is better shown by this other photograph (see Exhibit I), it being a little larger. Under the press is the bottom ring for a conning-tower tube. A man is standing beside this ring, and you will notice that he is less than half the height of the ring. Underneath each of the recent conning-tower tubes such a ring is placed.

The plate from which that fragment was cut was this character of plate (see Exhibit G), the ingot being forged out into a long, thin slab which, as I say, would just about lie on the floor of this office. In this condition it is $13\frac{1}{2}$, 14 or sometimes as much as 18 inches thick.

In the various processes it is necessary to handle these great masses, weighing in this condition probably 80 tons. These great masses (see Exhibit F) have to be handled 46 times. Each plate must be handled 46 times before you can get it into that condition. Even when it is ready to go down for the ballistic tests each plate has been handled——

Senator PENROSE. What do you mean when you say, handled 46 times?

Mr. BARBA. Such processes as forging, carbonizing, quenching, heating, annealing, and testing. In short, the necessary process, if everything goes right and you do not need to repeat any, requires each plate to be handled 46 times before it is presented for ballistic test.

Senator PENROSE. And all those processes, as I understand it, require high skill and great judgment?

Mr. BARBA. Very much so.

Senator PENROSE. That is to say, if any one of those processes was carried too long or too short a time it would destroy the efficiency of the plate?

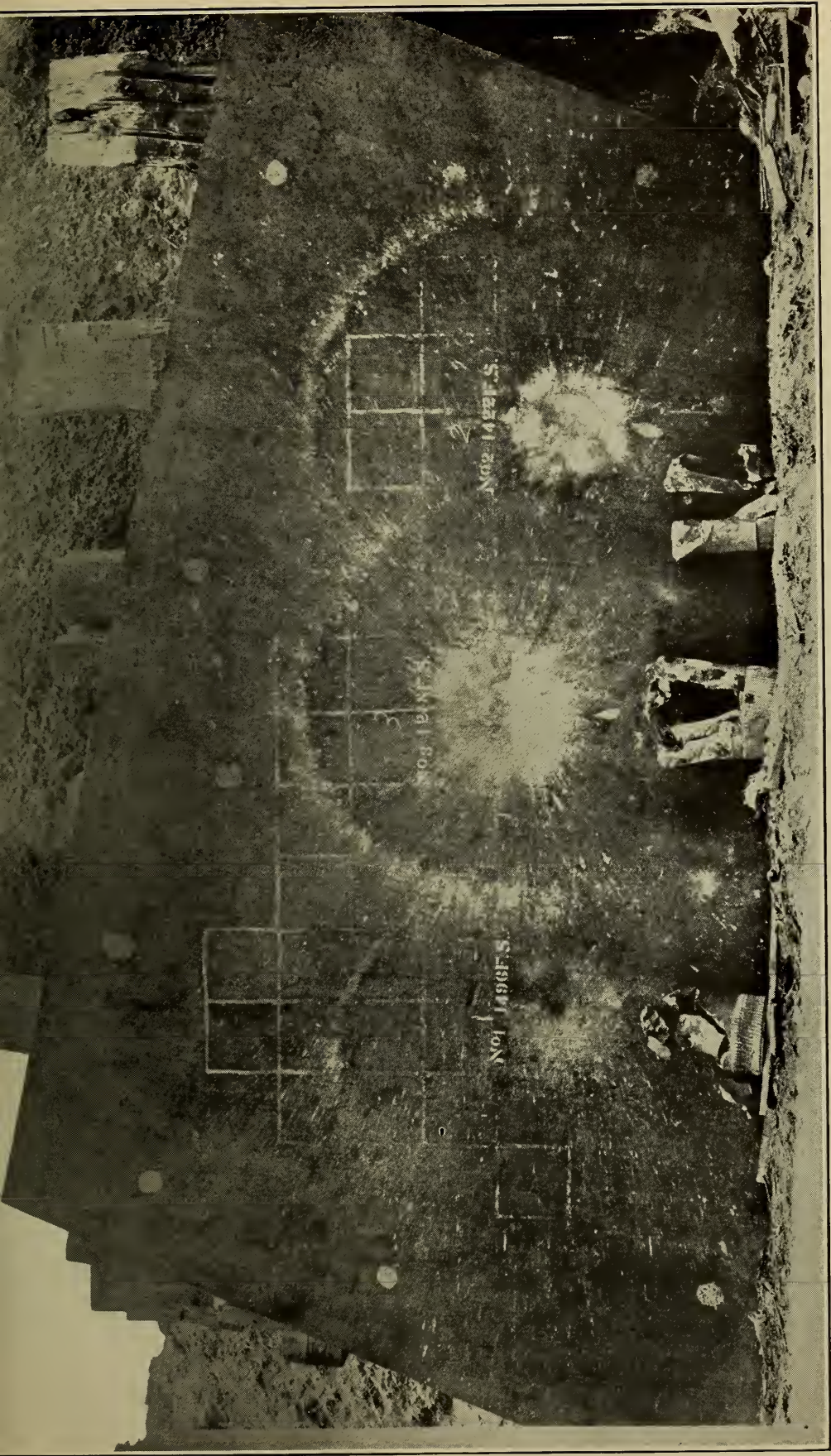
Mr. BARBA. Very much so. Not only that, but in no place is the sequence of these operations a matter of record.

EXHIBIT A.



STEEL INGOT WEIGHING 320,000 POUNDS. SHOWING HUGE MASSES NECESSARY.

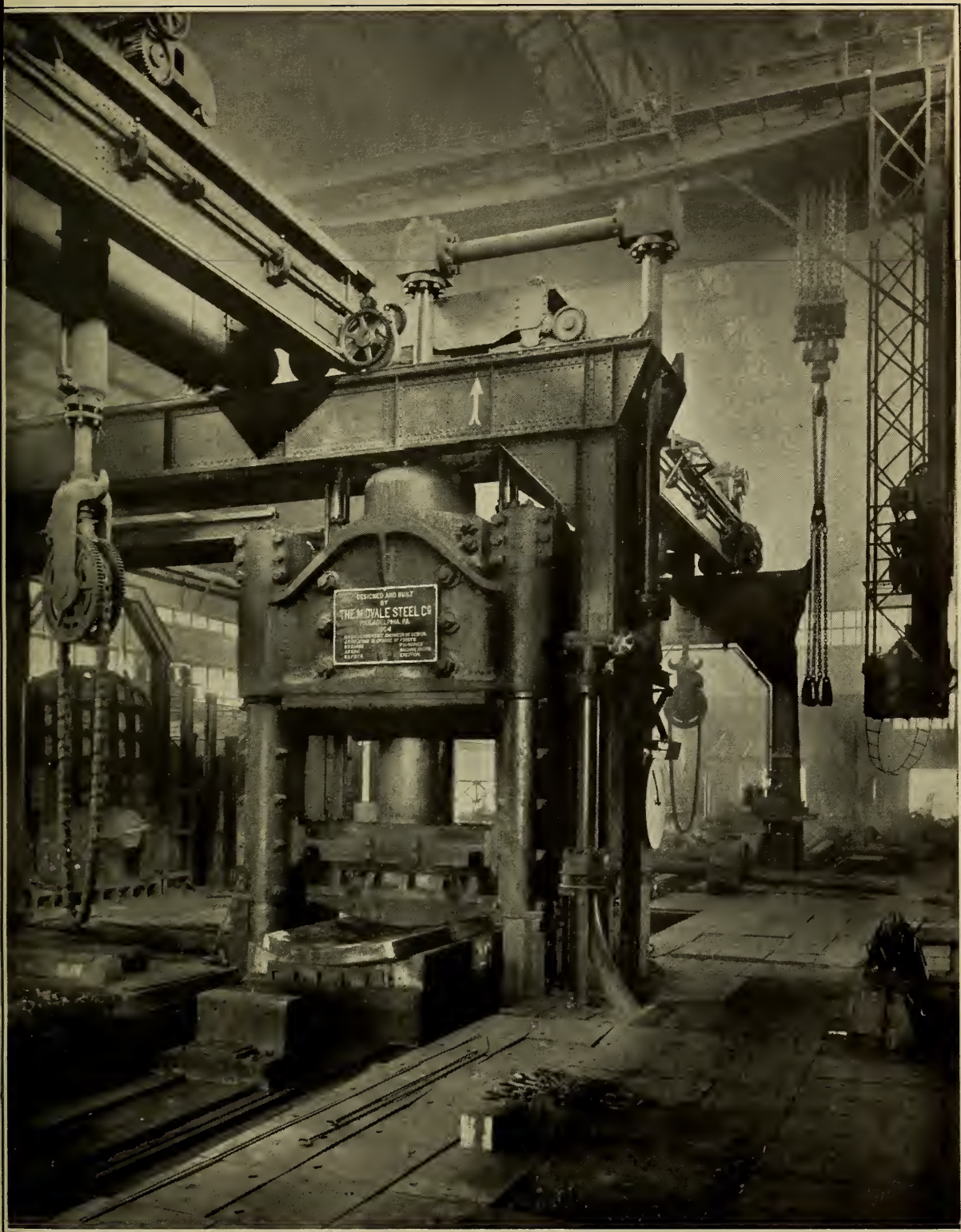
EXHIBIT B.



MIDVALE STEEL COMPANY PLATE NO. 3162-258" X 132" X 12"-TESTED BALLISTICALLY AT U. S. NAVAL PROVING GROUND, INDIAN HEAD, MD., JULY 16, 1915, REPRESENTING GROUP S-2, UPTAKE ARMOR, FOR U. S. S. "MISSISSIPPI," CONTRACT DATED NOVEMBER 7, 1914. GUNS USED, 12" AND 14" B. L. R.

| Projectile. | Velocity desired. | Actual velocity. | Penetration. | Flaking. |
|--------------------------------|----------------------|---------------------|--------------|----------|
| 12" crucible, lot 1, 1910..... | 1478 | 1496 | 7/8" | None. |
| " " " 4, " | 1478 | 1422 | 3/4" | " |
| 14" " " 2, " | 1295 | 1278 | 1 1/2" | " |

EXHIBIT C.



A 9,000-TON HYDRAULIC FORGING PRESS.]

EXHIBIT D.



ONE OF THE 14-INCH TRIPLE GUN TURRETS FOR U. S. S. "PENNSYLVANIA." MADE BY THE
MIDVALE STEEL COMPANY.

Thickness of plates, 9", 10", and 18". Weight, 507,220 pounds.

EXHIBIT E.



UPTAKE ARMOR FOR THE U. S. S. "ARIZONA." MADE BY THE MIDVALE STEEL COMPANY.
Height, 15' 9 $\frac{3}{4}$ "; length, 41' 9"; width, 29' 4". Thickness of plates 9", 12", and 15". Weight, 808,515 pounds.

EXHIBIT F.

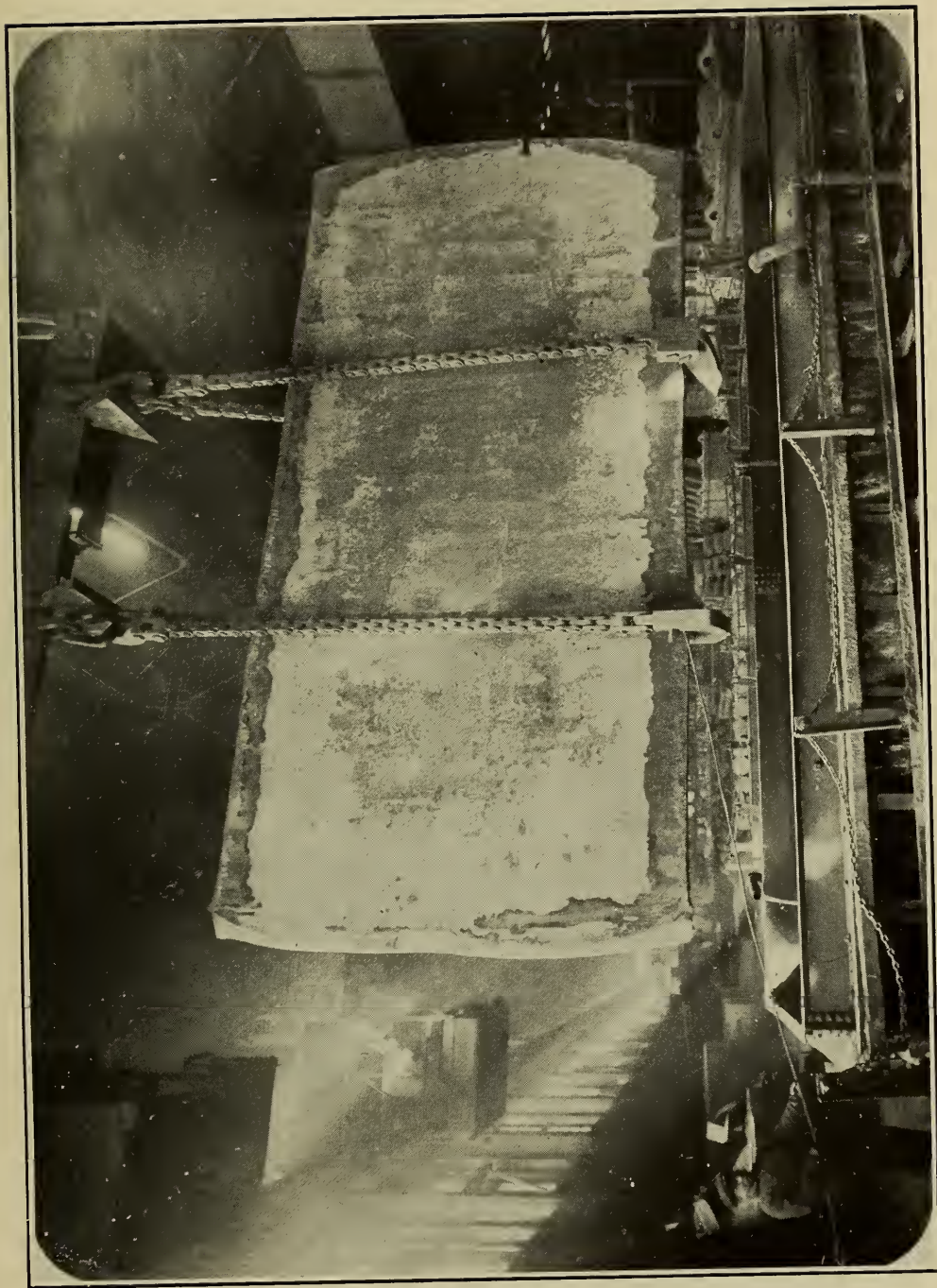
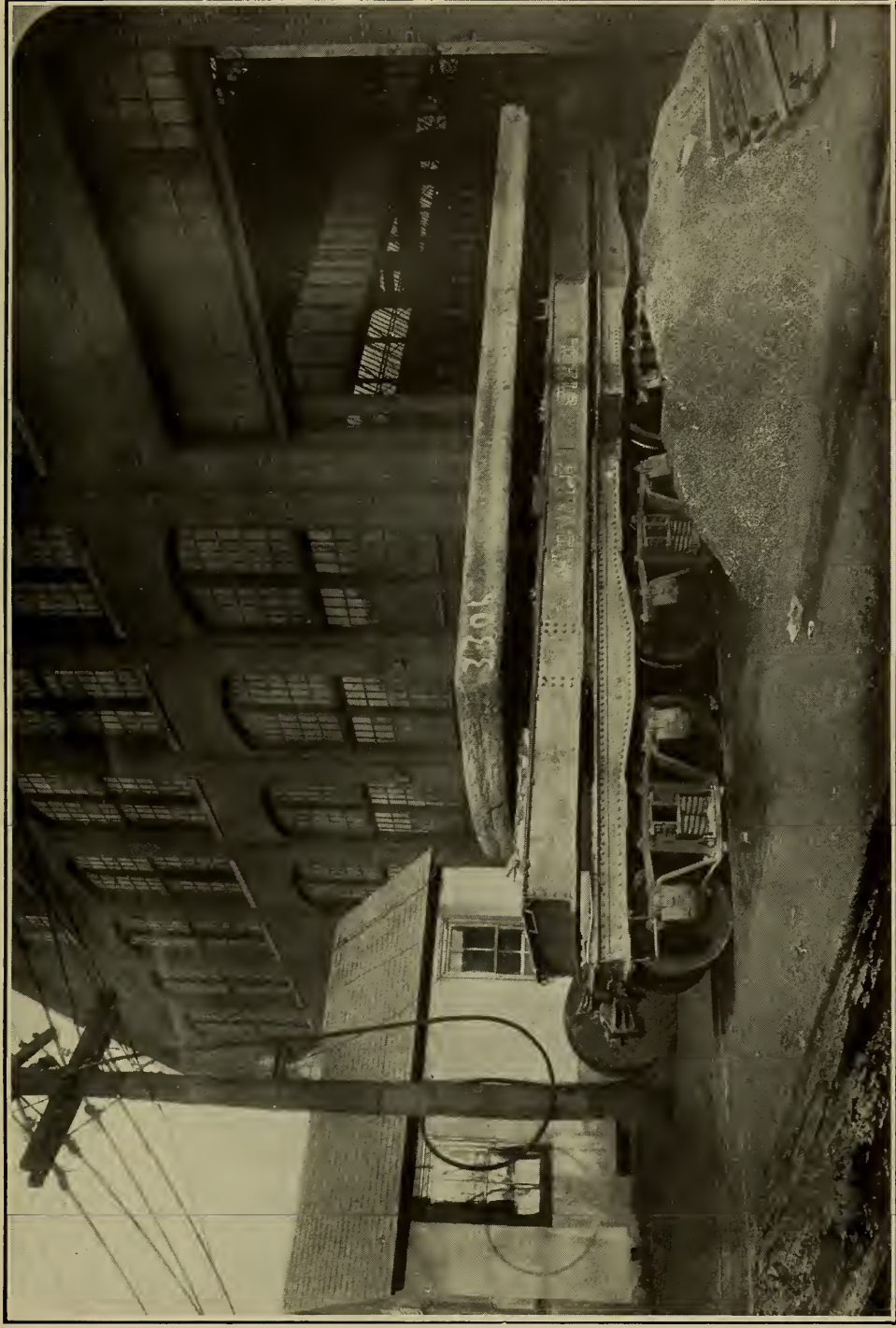


PLATE UNDER TREATMENT.

Length, 305"; width, 147"; thickness, $1\frac{3}{4}$ "; weight, 170,000 pounds.

EXHIBIT G.



THE FINISHED TREATED PLATE. READY FOR MACHINING.

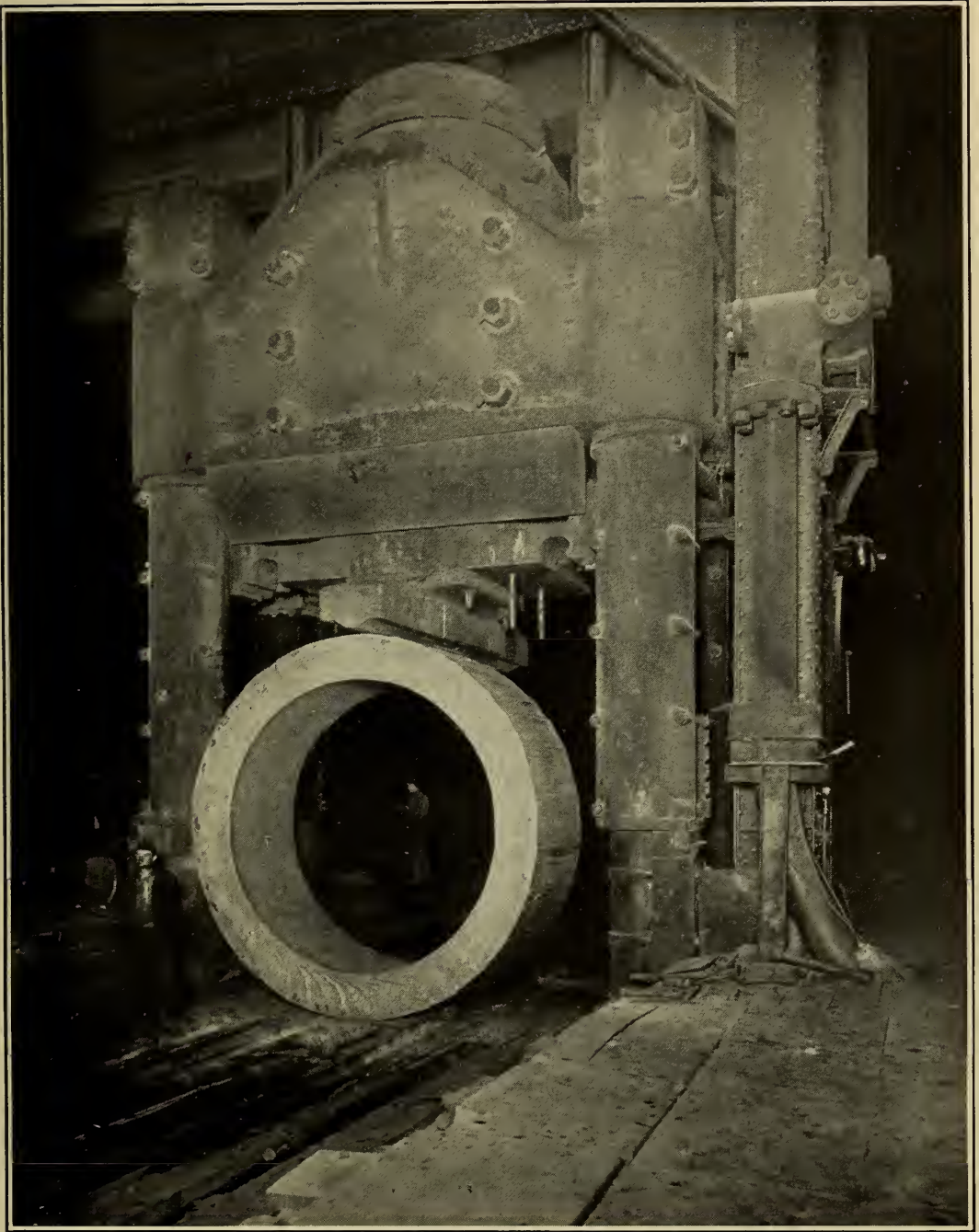
EXHIBIT H.



ONE OF THE BARBETTES FOR U. S. S. "OKLAHOMA." MADE BY THE MIDVALE STEEL COMPANY.

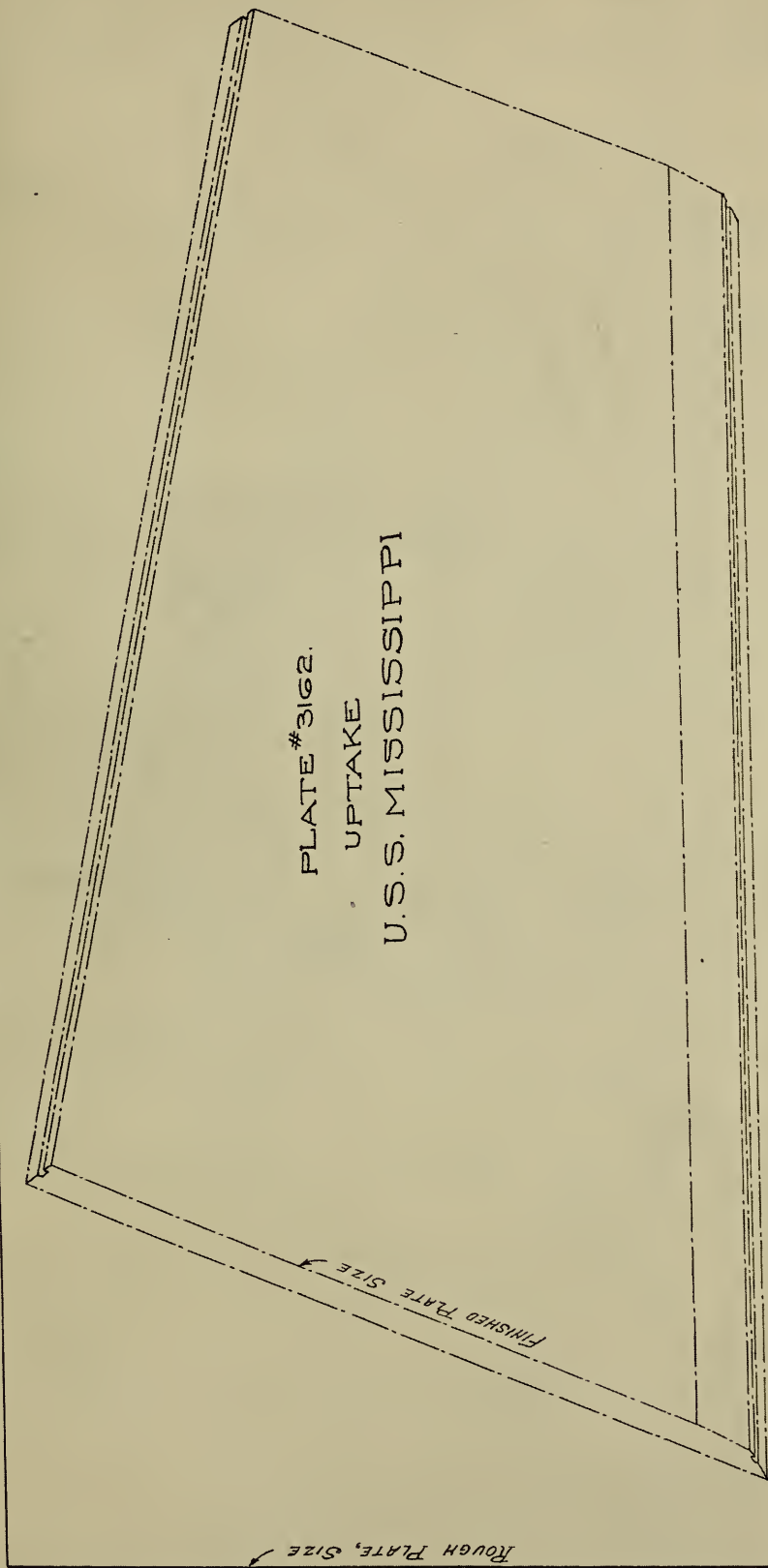
30' 2" diameter x 22' 11 $\frac{3}{4}$ " high x 13" thick. Total weight, 1,110,000 pounds.

EXHIBIT I.



10,000-TON HYDRAULIC PRESS, FORGING FIRE CONTROL RINGS FOR
UNITED STATES BATTLESHIPS.

137" O. D., 109" I. D. by 45" long. Weight, 85,000 pounds.



| | | |
|----------------------|----------------|----------------|
| INGOT WEIGHT | = 200,000 LBS. | } MACHINED OFF |
| ROUGH PLATE WEIGHT | = 140,000 " | |
| SHIPPED PLATE WEIGHT | = 78,600 " |  | MATERIAL = 44%. |

Senator PENROSE. How do you mean?

Mr. BARBA. It is a matter of the experience and the judgment of the men who are doing the work. When we began on armor in 1903 and 1904 I was in charge of a manufacturing department. While I was in charge of that department and charged with the duty of putting these ingots into shape for the press, I personally witnessed the preparation of the molds and the pouring of the first 1,200 ingots. Whether it was day or night or Sunday or any other time, I was personally on the job, training the men, training my lieutenants and assistants, so that they could go on.

Senator SWANSON. Is the decision as to how long any process should be continued left to the general employees or to some special person?

Mr. BARBA. To some special person who is responsible for every decision as it comes along. The degree of importance of that decision, Senator, is determined by the head of the department.

Senator SWANSON. He reaches the conclusion as to whether it has obtained a certain condition before the process shall be changed.

Mr. BARBA. Of course, you understand there are delicate measuring instruments used for temperature, but that is not all. The function of time and temperature is the one important thing that the biggest man in the department judges and decides for himself. The foreman on the work, the man whom you would pay \$5,000 a year to handle armor is not allowed to make those adjustments. He is not a big enough man. Your \$5,000 man may make those adjustments in lesser things; in bigger things he goes at once to his chief. Up until a few months ago those things were brought to me almost daily.

Senator CHILTON. From what does that man make up his judgment?

Mr. BARBA. From his instruments; the eye is not used in this work.

The CHAIRMAN. All these processes are in accordance with the specifications you receive from the Navy Department?

Mr. BARBA. The specifications we receive from the Navy Department provide for the testing of the finished product. They do not provide, except in the most general way, for any process to be used in the manufacture.

The CHAIRMAN. They do not specify the ingredients that go into an ingot?

Mr. BARBA. They specify the ingredients so far as certain impurities, such as phosphorus and sulphur are concerned. If my recollection is correct, the later specifications for armor do not specify any ingredients; but the manufacturer must provide a schedule of the chemical composition of the material and fix limits between which he agrees on each contract to bring every plate in the contract. That is more particularly true of projectiles than armor, but generally that is followed on armor.

Senator CHILTON. With respect to weight, how large are the pieces that they put on a vessel?

Mr. BARBA. Here is a photograph (see Exhibit J) of one of nine plates in the uptake for the *Mississippi*. That plate is 228 inches long, which is 21 feet, perhaps the length of this room. It is 132 inches wide, which is exactly 11 feet, and is 13 inches thick. Nine of those plates put together in this fashion (see Exhibit E), Senator [indicating on photograph], make the uptake. You see they are joined at the edges in the form of a polygon.

This is a photograph (see Exhibit B) of successful ballistic test of the very plate that Senator Chilton has in his hand. There, again, armor-piercing projectiles have been sent against the plate, and the small damage they did to the plate is clearly noticeable.

In our contract, which is now just about closing, we have 1 group yet to ship. We had 13 groups, and we had three failing tests and 13 successful tests, testing 16 plates to get 13.

Now, after these plates are forged in the press to the shape and size that I have just described—that is only the earliest step in the process. That requires a process of seven or eight weeks for one group of 600 tons. Then those plates are thoroughly cleaned, so that the surface is as clean as a plate of glass. They are packed in a charcoal or carbonaceous mixture, two together in the form of a sandwich and two more on top of that, in a furnace which is twice the size of this room—24 feet wide, 50 feet long, and 18 feet high.

Then for a period of from 18 to 28 days those plates are kept in that furnace and held at so high a temperature the eye can not look in the furnace without a blue glass—the trained eye can—the temperature is approximately 2,000° F., which is nearly the temperature of melting cast iron. For the whole of that period, practically three weeks, those plates must be kept at that temperature in order to give them the hard face—the face that will scratch glass, the face that can not be machined by any tool, the face that is intended to crack off the nose of a projectile.

After that is done we must submit all the plates in a group, ranging from 10 to 24 in number, to the inspector for inspection and ballistic test. That plate is then trimmed to its finished size, and it is sent down to Indianhead and fired at.

To show how much waste there is in this plate, this parallelogram in this photograph (see Exhibit J) represents the plate with which we start, and the inscribed line represents the plate that we ship, being only about 55 per cent of the plate that we present. The rest of it, even after all the prescribed scrap discards are made, the sinkhead 30 per cent, etc., must be sent back to the furnace and remelted. And to-day, after having melted no armor since September 28, we have practically 11,000 tons of this scrap piled up in our works, with which we can do nothing except wait for another armor contract, or sell it in the form of bar steel to the automobile trade, with which we really do have a large business. We are melting up this scrap as fast as we can and sending it out into the country as remade steel, using it in the place of new raw materials.

That, I submit, is a feature of the business which the Government is not in a position to undertake. They can not go into the bar-steel business after they have acquired this accumulation of scrap as a residuum from the material they manufacture.

Admiral Strauss's report last year showed that the average shipment of finished plate to the shipping points is from 30 to 33 per cent of the ingot weight that is produced. The other 66 per cent must be remelted and used in other forms.

Here is a photograph (see Exhibit D) that shows that particular plate which fronts all modern turrets. That plate is 18 inches thick, the biggest and heaviest plate we make, and ships probably 24 per cent of what we start with.

To get an idea of the magnitude of armor when set up, we must set up an entire barbette in the shop. Here (see Exhibit H) is the upper barbette for one of the older battleships, the *Oklahoma*, perhaps only four years ago. It is made up of 10 sections, the whole making a complete circle 22 feet 11 inches high and 20 inches thick. You can understand from the men standing beside it the magnitude of the apparatus that must be used.

Senator POINDEXTER. What are those holes?

Mr. BARBA. Those are the ports through which the three guns will project.

Senator POINDEXTER. Those are cut there after the plate is finished?

Mr. BARBA. They are cut after the plate is finished. There are soft strips left around there that enable us to cut them through.

Senator POINDEXTER. You do not harden this?

Mr. BARBA. It is hardened in the solid state, and provision is made to cut out these soft parts. If you are a little unfortunate in judging where your soft streak goes you must grind it with an emery wheel; no tool can cut it.

There is a picture (see Exhibit D) of the completed turret, showing the plate. I only wanted to endeavor to have the members of the committee visualize in some degree the magnitude of the apparatus and the masses with which the armor maker must deal. Enlarging on that for just a moment, it is impossible to say that the apparatus and equipment that we have in existence now will be adequate in size to meet the requirements which may come to us through some building program the size and character of which is dictated by the experience of the very near future.

Senator SWANSON. How long has this machinery that you now have been in operation? How long since you have made any large purchases?

Mr. BARBA. We began in the beginning of 1904.

Senator SWANSON. Did you complete your plant about 1904?

Mr. BARBA. We completed our plant for armor, which was of the size and magnitude that we could then foresee.

Senator SWANSON. Has it been available for us up to this time?

Mr. BARBA. With certain additions. The armor has grown in size, grown in weight, so that it bears no resemblance now, except in general character, to the sizes, weights, and masses with which we started.

Senator SWANSON. There has been no absolute loss of machinery up to this time, except the additions you have had to make?

Mr. BARBA. Yes. I have one instance in mind where, when we started, a 60-ton traveling crane in the armor forging shop was, we thought, ample for every load. In 1914 the plates had grown to such a size that that crane was overloaded, and we had to couple two cranes together, and with that very cumbersome apparatus lift the heavy loads that were imposed upon us, the newer building programs. So, after the completion of our little contract in 1914 we tore that crane down, and instead of the 60-ton crane put in a 150-ton crane at three times the cost of the original crane. That same replacement was made in the armor machine shop, where we had 60-ton cranes, and had to replace them.

Fortunately, we so designed our machine tools as to permit of their carrying under their cutting heads and carriages plates as large as we have yet been called upon to produce.

But now, even with this big press, the photograph (see Exhibit I) which is lying before you, the distance between the columns of that press is what governs the size of a plate we can make. That distance is 152 inches in that press, and the Army to-day is asking for plates that that press can not make because they want a plate that is wider than will go between those columns.

We have been for over two years building a press the distance between the columns of which will be 17 feet 6 inches instead of 12 feet 8 inches.

Senator PENROSE. And that press you have now will be of no further use?

Mr. BARBA. Only for the smaller work, Senator. With the larger press we are building we hope that we shall be able to care for the needs and requirements of the Government when they shall ask us for larger and heavier plates. The estimated cost of the press and the pumps will be \$1,066,000; estimated cost of secondary equipment, such as the dies, furnaces, cranes, and extensions to the building will add a little over \$400,000 more, so that we are to-day spending money, appropriated year by year as we progress with this press, and we expect to spend \$1,500,000 in an additional plant, \$200,000 of which is already spent in the construction of this press to its present stage. I think we shall be another 12 months before this enormous press, the biggest in the world, will be completed and ready to run.

I have endeavored to lay these small descriptions of practical facts before the committee in the hope, as I said, that I might for them visualize the size and magnitude of the operations that the committee is considering undertaking.

I want to say, in addition to that and in support of it, that when Midvale began the manufacture of armor it used principles which its long experience in steel making had made it perfectly competent to employ, and we were successful in our first efforts, technically. Getting the plant and equipment built and shaking down into running order caused us to lose money on our first products, of course; but our technical success was complete from the first, due to the exact fundamental knowledge that our manufacturing men had of the principles that underlie this difficult manufacturing.

In support of that, the records show that we were attacked by the Krupps and sued in one of the most bitter technical legal fights that this country has seen, and we beat them in every court up to and including the United States Supreme Court, all of which courts ruled that we had not used or infringed the Krupp patents, which were the basis of the so-called Krupp armor manufactured at that time, in 1904.

Senator POINDEXTER. Had they taken out patents in this country?

Mr. BARBA. They had taken out patents in this country, which have since expired; but at that time these patents were current, and they very properly thought, from their point of view, that we must be using their patents or we could not successfully manufacture armor. All the courts decided that we were not infringing their patents. I merely wish to emphasize the fact that the fundamental knowledge of steel metallurgy and its practice was what enabled our staff to

begin and successfully complete, from a technical point of view, our early armor contracts.

Senator POINDEXTER. Did you ever have one certain man who evolved these processes?

Mr. BARBA. No, sir.

Senator POINDEXTER. Or was it the result of the work of a number of men?

Mr. BARBA. It was the work of a number of men. At that time I had been in the employ of the company for 24 years, and had served in practically every capacity up to being in charge of my own particular manufacturing department. Alongside of me were other men, better trained, better educated, who were in charge of other departments and were constantly working out these processes from what we knew were the underlying principles that must be employed to make a successful issue.

The CHAIRMAN. Mr. Barba, what induced you to go into the manufacture of armor originally?

Mr. BARBA. We expected to make a profit.

The CHAIRMAN. Why?

Mr. BARBA. Because we needed the money.

The CHAIRMAN. No; that was not the reason. Was it not because you thought Carnegie was making more?

Mr. BARBA. We hoped they were making a profit, but we had no means of knowing. We expected to make a profit.

Senator PENROSE. Did not the Government advise others to come in and make armor?

Mr. BARBA. The Government every year issued public advertisements for armor. To five of those we responded and were the lowest bidders, and were denied any portion of the awards.

The CHAIRMAN. If you bid the lowest why were you not given the contract?

Mr. BARBA. Because the Government elected to consider that, not having a plant actually in existence, we could not produce the armor in satisfactory fashion, and in the plan required, and had not so demonstrated. Therefore, when we were preparing the bid the sixth time we had started our plant, started its erection, and gave satisfactory and substantial evidence to the Government officials that we could and would complete the plant in time to make deliveries as required.

The CHAIRMAN. Who was secretary of the Navy at that time?

Mr. BARBA. I think it was Paul Morton, but I am not quite sure.

Senator POINDEXTER. Do you remember the year?

Mr. BARBA. 1903; the end of 1903.

Senator PAGE. Are your services confined solely to armor plate?

Mr. BARBA. No, indeed, Senator Page; we manufacture railroad tires and wheels on which our trains run; axles, bar steel——

Senator PAGE. I refer to your special and individual services.

Mr. BARBA. My services? Oh, no; I have been in charge of half a dozen departments in the works. I was general superintendent five years ago. I then became general manager, and am now vice president. My business is to control the manufacture and the output.

Senator SWANSON. Do you recall the price at which you bid on armor plate and the price at which the contract was awarded?

Mr. BARBA. I can very readily get that out of my papers, Senator. I do not remember the prices at the present time.

Senator SWANSON. But you felt assured you could equip a plant and furnish the armor at the time required in the contract?

Mr. BARBA. We did, sir.

Senator SWANSON. And your company at that time was a solvent company?

Mr. BARBA. Entirely so.

Senator SWANSON. How long would it have taken you to complete your plant at that time?

Mr. BARBA. We estimated 20 months.

Senator SWANSON. The contracts required the armor to be delivered in what space of time?

Mr. BARBA. In 20 months. We made a running start the sixth time we came up, and had a portion of the plant in operation, and had made experimental plates and tested them in 1903.

Senator SWANSON. Then the Government was at that time indisposed to encourage people to go into the armor-plate business unless they would build their plant and have it equipped first?

Mr. BARBA. I did not participate in the business negotiations at that time, but that is the thought that has been conveyed to me in all our talks since.

Senator SWANSON. Consequently there was no encouragement or inducement for people to go into the armor-plate business unless they were equipped to do the work at once?

Mr. BARBA. Quite so. That is all I wish to offer at this time. If you wish to ask me any questions I should be glad to answer them, but I would suggest that Mr. Dinkey take the stand and make his statement. I should be glad to be questioned in any line that any Senator wishes at any time.

The CHAIRMAN. Mr. Barba, I want to ask you a question. When you first bid you felt entirely competent financially and in every other way to carry out your contract?

Mr. BARBA. Entirely so.

The CHAIRMAN. And you do not know why the Navy Department denied you the contract?

Mr. BARBA. I am giving you in my last answer, Senator Tillman, the information which has been current among those of us who were at the front in the company's management during the years that immediately followed that, and that is they were told that, not having a plant and not having satisfactorily proved their ability to manufacture armor, they would not get a contract. So we made a successful armor plate, had it tested at Indianhead in 1903, and had the plant practically half completed when we made our sixth and first successful bid.

Senator SWANSON. Your armor-plate department is a separate part of your establishment, is it not?

Mr. BARBA. Only so far as four buildings are concerned.

Senator SWANSON. Do you keep the books of that concern to ascertain the profits or losses of the armor-plate business?

Mr. BARBA. We do.

Senator SWANSON. Do you object to telling the committee as to how much money you have invested in the armor-plate business?

Mr. BARBA. I think Mr. Dinkey's statement, Senator Swanson, will give you that whole thing in collected form. May I ask you to question him on that?

Senator SWANSON. I will do so.

The CHAIRMAN. Mr. Barba, how long have Mr. Dinkey and you been associated in the same concern?

Mr. BARBA. Since October 1, 1915.

The CHAIRMAN. Recently?

Mr. BARBA. Yes, sir.

The CHAIRMAN. Where was Mr. Dinkey before that?

Mr. BARBA. Mr. Dinkey was president of the Carnegie Steel Co. for, I think, 12 years prior to that time. And when the Midvale Steel Co. purchased Worth Bros. plant and the Remington arms plant and really became a completed and rounded-out unit of steel manufacture we very seriously needed a man of high constructive ability in lines with which our old Midvale practice was not familiar, and we were exceedingly fortunate in securing Mr. Dinkey to take the presidency of this company, because of his exceptional knowledge, ability, and capacity in those directions.

Senator SWANSON. Mr. Barba, have you ever made an estimate yourself, independent of others, as to what the cost of armor plate per ton would be with your factory running at its full capacity?

Mr. BARBA. I have made such estimates in connection with our accounting department and our other manufacturing superintendents, certainly.

Senator SWANSON. What conclusion have you reached as to the cost of the armor, per ton, on the full operation of your plant?

Mr. BARBA. That again, I think, Senator Swanson, is covered in Mr. Dinkey's statement. I would dislike to cut into that.

Senator O'GORMAN. Have you not some impressions regarding that matter yourself?

Mr. BARBA. Senator O'Gorman, I do not think impressions are worth much.

Senator O'GORMAN. The committee will determine their value. You are an experienced man. If you are not prepared to give a positive statement of facts, or even of opinion, the committee may derive some advantage from your impressions. What is your impression as to what it will cost your company to manufacture this armor plate if your plant was going at its full capacity all the time?

Mr. BARBA. If our plant were going at its full capacity all the time I am fairly well satisfied that the figures reported by Senator Tillman are very close to the truth. That is, the mill cost alone, without overhead of any kind, would approach the figure of \$265 that he used.

Senator POINDEXTER. Senator Tillman, in those figures of yours that have been quoted so often did you include any overhead charges?

Senator TILLMAN. I believe that Admiral Strauss can answer that question better than I can.

Senator O'GORMAN. And yet your impression, Mr. Barba, as to the \$265 per ton correctly representing the cost of production is based on the assumption that your plant was operated continuously and to its full capacity?

Mr. BARBA. Yes, sir.

Senator SWANSON. Has any statement ever been made to you in connection with the armor-plate department, not contained in your

books, as to the cost of this armor, from which you could form an idea yourself? Have any such reports ever been made to you?

Mr. BARBA. Senator Swanson, we do that each year, each contract, and the cost of producing armor has varied directly as the number of tons produced in a given time, when considered with respect to the severity of the specifications, as to whether they may have been an accustomed specification or a new specification recently imposed.

Senator SWANSON. Suppose the Government should call for bids that would cover the full capacity of your plant and you were desirous of bidding for that contract. Before you make your bid do you have the various people in control of the different departments in this plant make an estimate as to the cost so you can make a bid? Has that been the course pursued in the past?

Mr. BARBA. That has been the course pursued in the past, taking the bids in connection with the recorded costs and expenditures on previous contracts that are in any way comparable or that will throw any light.

Senator SWANSON. Have you any of those reports that were made by the expert as to the cost at that time of armor plate before you made the bid that you could furnish the committee—any of those reports that were made to the directors or to the manager of the armor-plate department?

Mr. BARBA. The directors do not get those reports in our company. That is a function of the general manager's department.

Senator SWANSON. Could the general manager furnish this information as to the basis and what reports were made when these bids were made at various times?

Mr. BARBA. Again, I think Mr. Dinkey will cover that point.

Senator PENROSE. All right; I suggest that Mr. Dinkey go on.

Senator CHILTON. Let me ask Mr. Barba one question before he stops. You say Mr. Dinkey came into your company last October?

Mr. BARBA. Yes, sir.

Senator CHILTON. Who was president before that?

Mr. BARBA. Mr. Charles J. Harrah.

Senator CHILTON. Where is he?

Mr. BARBA. I think he is on his way to Honolulu. He sold the works entirely and retired completely from any contact with it.

Senator CHILTON. He sold the Midvale Steel Co.?

Mr. BARBA. He did; he sold the Midvale Steel Co.

Senator CHILTON. To whom?

Mr. BARBA. To a group of men who formed the Midvale Steel & Ordnance Co., after purchasing the works of Worth Bros., at Coatesville, and the Remington Arms Co.

Senator CHILTON. When was that done?

Mr. BARBA. That was consummated September 29, 1915.

The CHAIRMAN. Can you give the committee a list of those men, the present owners of the Midvale Co.?

Mr. BARBA. The list of stockholders is a very long one, sir. I can tell you the board of directors; it has all been published in the newspapers. They are the men who are controlling the company.

The CHAIRMAN. They are elected by the stockholders, of course?

Mr. BARBA. Yes.

The CHAIRMAN. And they usually elect themselves, they being the large stockholders?

Mr. BARBA. Yes.

The CHAIRMAN. We would like to have that, Mr. Barba.

Senator CHILTON. What was the name of the president before that time?

Mr. BARBA. Mr. Charles J. Harrah.

Senator CHILTON. Then the information that Mr. Dinkey will give is information derived from others and not information that he has personal knowledge of?

Mr. BARBA. I think Mr. Dinkey's statement will speak for itself, and you will be able to question him on that point.

Senator CHILTON. I was just going to say that evidently your former president—if the president be the man in whom would be reposed this confidence and information—would have probably more personal information about it than Mr. Dinkey, would he not?

Mr. BARBA. I doubt that, Senator Chilton——

Senator CHILTON. Why would you doubt that?

Mr. BARBA. Because our former president used his general manager as the man on whom he relied for all that information, and for two years that was myself.

Senator CHILTON. That was what I was going to ask. Then the man actually in charge of it, being an intelligent man like yourself, can tell as much about the books and reports from others as Mr. Dinkey can?

Mr. BARBA. Certainly; but I happen to know the substance of Mr. Dinkey's statement. I think he should be allowed to come before the committee and give it in coherent form.

Senator CHILTON. We have not come to Mr. Dinkey yet. I would like you to tell us that.

Mr. BARBA. You can question me after you have heard Mr. Dinkey's statement, I am sure.

Senator CHILTON. You have had the benefit of Mr. Dinkey's statement and that personal knowledge of your own. Therefore are you not in a better position to tell us than Mr. Dinkey could possibly be?

Mr. BARBA. Possibly after you hear Mr. Dinkey's statement you will want to question me, and I am sure no one will object. I know I shall not. But I would certainly like for you to let Mr. Dinkey make his statement in coherent, solid form before the committee, and you can question him all you like, question me all you like, and you will then have more enlightenment than if I gave you the gist of his statement as I remember it.

Senator CHILTON. Then it is a matter of senatorial etiquette as between you and Mr. Dinkey?

Mr. BARBA. I think you understand those conditions perfectly. [Laughter.]

Senator O'GORMAN. You say you are familiar with the statement that Mr. Dinkey is to make?

Mr. BARBA. Quite.

Senator O'GORMAN. You have read it?

Mr. BARBA. Yes.

Senator O'GORMAN. And you and he have been in conference over the subject matter?

Mr. BARBA. Thoroughly.

Senator O'GORMAN. Then it is your testimony as much as his?

Mr. BARBA. Yes, except the form and the greater part of the structure.

Senator O'GORMAN. That he has made his own?

Mr. BARBA. Yes.

Senator O'GORMAN. Why was the prepared written statement not delivered by you rather than by Mr. Dinkey?

Mr. BARBA. Mr. Dinkey is the superior officer, Senator O'Gorman. I assisted Mr. Dinkey when he called upon me for information.

Senator O'GORMAN. But he, of course, has had briefer experience in this company than you have had?

Mr. BARBA. Oh, yes, sir; but his experience in the armor-plate business is much longer than mine.

Senator O'GORMAN. Is he the same gentleman who was examined here some years since and whose testimony is in this report?

Mr. BARBA. There is only one A. C. Dinkey who ever touched armor.

Senator O'GORMAN. I notice that at that time he declined, for reasons doubtless satisfactory to himself, to give any real information as to the cost of producing armor plate.

Mr. BARBA. I think he will be glad to explain that declination. I made the same declination for our company, for a reason which was expressed by Mr. Grace a week ago to-day. I could not have expressed it in as choice terms as Mr. Grace used.

Senator PENROSE. At the hearing last week these gentlemen went quite fully into that.

Senator CHILTON. That testimony has not been printed?

Senator PENROSE. Yes; it is right before you.

Senator SWANSON. I understand the objection made by Mr. Grace was that he thought the Government was contemplating being a competitor, and he did not like to let the competitor ascertain his secrets and cost of production.

Mr. BARBA. That is the passage in Mr. Grace's testimony to which I refer, and I heartily indorse it. The committee gave us questions which sought to draw out and make part of a printed public record, spread broadcast throughout the world, manufacturing data—not cost data, but manufacturing data—which we do not care to have go outside our shops.

Senator SWANSON. It was manufacturing data?

Mr. BARBA. Yes, sir.

Senator SWANSON. Do you object to an expert from the Government going through your department and trying to ascertain from your books and reports that you have made the exact cost of this armor to you?

Mr. BARBA. We do not object to any certified public accountants in good standing, men who are just as confidential with the information they gather as is your attorney, doing all of that, provided the results in detail are not spread before the world in the form of a printed document.

Senator O'GORMAN. Well, that is a reasonable attitude to take.

Senator SWANSON. Have you reached a conclusion, if this building program of the naval committee goes through, as to what you would be willing to furnish the Government armor plate for for the next five years, operating your plant at its full capacity?

Mr. BARBA. It is a little difficult to give, under conditions like those, the vital point in a commercial transaction, when the correspondingly vital point in as positive form is not first clearly stated. I do not believe that the committee is in a position to make us a definite offer of anything; and why, in all fairness, should a business man be called upon to develop his vital commercial situation before he has an equally vital situation laid before him?

Senator SWANSON. Well, from the examinations of the committee, some of us think that the profits on armor plate have been very large, and there is a disposition for the Government to go into the armor-plate business, which has been largely controlled by an idea of the excessive profits. Of course, the purpose of the bill is to save the Government from what have been thought to be excessive profits, and I have no doubt the question would be to some extent controlled by what you are willing to manufacture armor plate for.

Mr. BARBA. I think Mr. Dinkey will completely satisfy you on that point.

Senator SWANSON. It seems to me that if we were to abandon this bill and this building program should go through, and we were then left to what you gentlemen might determine you would make armor for us, it would be a very vital matter. So I think it would be well for the committee and Congress and the department to know what you are willing to furnish armor for if this program goes through.

Mr. BARBA. I think Mr. Dinkey will satisfy you on that, sir.

Senator PENROSE. I suggest that Mr. Dinkey be permitted to proceed.

STATEMENT OF MR. ALVA C. DINKEY, PRESIDENT MIDVALE STEEL CO., PHILADELPHIA, PA.

(The witness was duly sworn by the chairman.)

Senator PENROSE. Mr. Dinkey, will you state for the information of the committee the company you represent and the official position you hold in it?

Mr. DINKEY. I am president of the Midvale Steel Co., of Philadelphia.

Senator PENROSE. How long have you been president?

Mr. DINKEY. Since the 1st of October.

Senator PENROSE. Will you state for the information of the committee what position you held prior to that time, and for how long a period?

Mr. DINKEY. I was president of the Carnegie Steel Co. for a little over 12 years.

Senator PENROSE. All right; go ahead in your own way.

Mr. DINKEY. If the committee will indulge me, I would like to submit a statement which puts in complete form the things which it seems to me we ought to have before us. Afterwards I shall be ready for any questions that you wish to ask.

Before reaching a final conclusion on Senate bill 1417, which provides for the erection of a Government factory for the manufacture of armor plate, we respectfully request that you give consideration to the following facts.

First. An authoritative account of the conditions which led to the building of plants in the country for the manufacture of armor plate

is found in House Document No. 193, Fifty-ninth Congress, second session, being a "Report of the board of naval officers, appointed under the act of March 3, 1905, as to cost of armor plate and armor plant."

From this report we quote as follows, page 29:

The establishment of the armor plant of the Carnegie Steel Co. was hesitatingly undertaken at the instigation of the Navy Department in 1890, as part of its Homestead Steel Works. * * * In 1902-3, the capacity of this plant was practically doubled to meet the then urgent need of the department for more rapid deliveries.

Under date of June 29, 1907, the Bureau of Ordnance wrote the Midvale Steel Co. as follows:

The bureau considers the price per ton offered by Bethlehem and Carnegie for "A," "B," and "C" armor, viz, \$420 and \$400, and \$400, and which did not limit the location to be assigned for any portion of the armor, are the lowest prices bid. In consideration however, of the closeness of the bidding and with the view to encouraging the upkeep of your plant, the department proposes to assign you 2,230 tons of the armor bid upon, provided you agree to accept it at the prices per ton of the lowest bidder.

Second. The present annual capacity of American plants in round figures can be stated as follows: The Midvale Steel Co., 7,500 tons; Carnegie Steel Co., 10,000 tons; and Bethlehem Steel Co., 12,500 tons; a total of 30,000 tons.

We submit that this tonnage is in excess of the requirements of any program which has been suggested and sufficient for a five-battleship program.

Third. On page 28 of the "Report of the committee to investigate the cost of an armor plant for the United States," House Document No. 1620, Sixty-third Congress, third session, there is shown as the total probable cost of armor, in a 10,000-ton Government armor plant, when operating at full capacity, \$262.79 per ton.

We submit that it is not fair to make any comparison between this figure and the selling price of armor plate, for the following reasons:

(a) This figure can be said to exhibit only the direct factory costs.

(b) In order to institute a fair comparison, the following items should be added: Depreciation of plant and equipment, taxes, and insurance, and administrative expenses.

Based on actual experience at Midvale, we estimate that the sum of the above charges would amount to about \$54.30 per ton, based on working at full capacity, which, taking the committee's figures as a basis, would bring the total actual cost to \$317.09 per ton.

The base price on the last bid submitted was \$425 per ton, leaving on the above basis an estimated profit of \$107.91 per ton, assuming that our plant would operate at full capacity—i. e., 7,500 tons per year—this would represent an annual profit of \$809,325. Our investment in this business is approximately \$6,500,000, so that the above return would represent a little less than 12½ per cent on the investment. However, during the last 12 years, the Government has used our plant to the extent of a little less than a total of 44,000 tons of armor, equal to 3,584 tons per year. On the basis of this average tonnage our calculation shows earnings of \$386,748 per year, equal to a little less than 6 per cent on the investment, which we submit as a very low percentage of profit on this difficult and hazardous business.

We regret that it is necessary to call your attention to the fact that all of the costs are not exhibited in the above figures, for the

reason that there have been periods when the plants have had nothing to do and have, therefore, carried idle expenses forward to be divided against future contracts. You may be surprised to learn that this is the situation at the present moment.

Owing to the highly technical character of this business, in order to retain an efficient organization we are compelled to carry on our pay rolls a number of high-salaried officers and operatives, even though the plants may be shut down, as they are at present, for the lack of orders.

We finished casting steel on our latest contract last October, and at the present moment are without orders on which to operate this department.

In considering this question, account should be taken of the high initial cost of the large units of equipment required to handle this heavy work, such as immense hydraulic presses, planing and boring machines, etc. As an instance, we are now considering the installation of a second forging press, the cost of which when installed, with its complement of furnaces, pumps, cranes, etc. will be approximately \$1,500,000. In the absence of orders for armor plate, these tools would not be suitable for any class of commercial forging and would, therefore, of necessity remain idle.

In support of the above statement we beg to again quote from "Report of the board of naval officers appointed under the act of March 3, 1905, as to cost of armor plate and armor plant," House Document No. 193, Fifty-ninth Congress, second session, as follows, page 33:

In order to obtain the full cost of armor plate at any private concern, there must be added to the production cost a proportion of the general administrative expenses of the whole works—taxes and insurance of the plant, and a host of general miscellaneous expenses that can not readily be itemized. Then, too, changes in the process of manufacture may require the installation of new equipment, or improved methods of production may make obsolete equipment maintained in current working order, so that it is proper that a further charge be added, making provision for such a general depreciation of the plant, as distinct from the current wear and tear thereof provided for in the maintenance charge under production cost, and that recognizes its possible total abandonment through a lack of any demand for armor or by reason of the discovery of some superior and radically different method of production. The total of the items under the production cost, if accurately assumed, represents the actual outlay of money necessary to the production of armor in any plant. The full cost, properly determined, shows the cost that must be considered by any private armor-making concern in fixing a selling price that will provide for a reasonable and proper return on the entire investment in the plant.

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As an illustration of the uncertainties involved in armor making and of the effect on the cost of it of a deficiency in the amount demanded, the latest contracts with the Bethlehem and Carnegie Steel Companies may be quoted. Prior to 1902, the combined full yearly capacities of these two plants was rather less than 10,000 tons. During that year an urgent but temporary demand for armor delivery made it necessary that both plants be greatly extended, and their combined capacities was then increased to and now is something over 20,000 tons.

The total award of armor under the latest contracts with these companies is approximately 3,600 tons, and this represents the entire Government armor works these companies will have in hand during the next calendar year. The expenses of the plants during this year must, in consequence, be distributed over an amount of armor that is no more than a normal two months' output of these two plants, and its cost to each per ton must, therefore, be out of all proportion to what it would be were their plants working continuously at full capacity.

Thus, in the discussion of the cost of armor-plate production from a given plant it is most important that due consideration be given to this question of economy of manufacture, as determined by the percentage of its full capacity that the current demand for armor permits it to produce. This board believes that when a demanded output is but one-half the economical capacity of a plant, the cost of production will be increased 20 per cent. Should the demand require but one-third the capacity, the increase in cost will be not far from 30 per cent.

Because of the fluctuation of this factor in the cost of armor making, as well as the great variations in the price of the materials entering therein, no estimate of cost may be considered as accurately representative of future conditions.

While you will look upon my statement as being made from the standpoint of self interest, nevertheless I believe that you should know that the existing armor-plate plants have almost nothing to do and will probably be idle the most of this year.

That producing capacity exists for a larger annual program than has ever been undertaken and if increased capacity is desired, we will, in the future as in the past, respond to the demand.

The question of a reasonable price for armor has been before some of the members of this committee a great many years. You know how widely the tonnages which you have had to place have fluctuated and you are fully aware of the costs incurred when a plant of this kind is compelled to stand idle.

I know I need make no argument before this committee of the blighting effect upon the goods of any factory, regardless of what it is making, if, either through the acts of the buyer or the seller, the operations are permitted to be conducted at a loss.

Difficult as our problems have been, still we have been able to keep available more than enough capacity to supply all your needs. I submit that the solution of the question of a satisfactory price is no more difficult than was the question of an increase of capacity, if both parties at interest will approach the matter in a spirit of fairness. I am sincerely offering our cooperation with any reasonable agency which this committee is willing to employ to dispose of what seems to me to be the only question between us.

Senator LEWIS. Mr. Chairman, I should like to ask this gentleman a question, if I may be tolerated. Mr. Barba, were you here last Tuesday?

Mr. BARBA. I was.

Senator LEWIS. You may have some memory of the question I asked Mr. Grace. I asked him if the companies had made a representation some years past that the reason they had added these extra prices was because of the highly scientific work, a certain limit of contracts with much necessary idle time, and that those things constituted the real reason for the extra-high price they were compelled to charge this country. Mr. Grace then said he did not remember having heard that statement.

I see that you now repeat that. Did you take that report and put those expressions in your statement, or did you take it from representations made at that time? Do you know whether that feature of your quotation was taken from representations made by your company to Congress, or do you take it merely from something your office is sending you?

Mr. DINKEY. I have made this after a great deal of study of the question.

Senator LEWIS. I am referring to the quotation.

Mr. DINKEY. I took it out of the report, and I wanted to present that part of the quotation, because I think it thoroughly represents—only that part of it—the conditions I want the committee to consider.

Senator LEWIS. I merely wanted to be sure that I was accurate about that.

Senator PENROSE. Senator Lewis, I do not quite understand what you mean by an extra-high price.

Senator LEWIS. It has been in my mind for years, Senator Penrose, that the real reason which the companies had for this extra cost was because it was an experiment to them.

Senator PENROSE. What do you mean by an extra cost? That is what I do not understand.

Senator LEWIS. The higher price they charge this Government than they charge other Governments.

Mr. DINKEY. That condition does not exist. We do not charge our Government more than other Governments.

Senator LEWIS. My point of view has always been, Senator Penrose, that the reason the companies made these high prices to our Government was because they had a limited market and a limited demand, a form of specialized labor at high wages, and that that would all be remedied if there was one continuous market and an assurance to whoever supplied these things that they were to have this market continuously and receive patronage sufficient to make up for all those losses.

Now, that observation of mine is meant to mean this, Senator. If the Government of the United States should give to one plant all of its business, with the constant increase of its Navy, with ships becoming obsolete and a necessity for new building, that would possibly meet all of these objections and all of the reasons which are urged by private companies for the present method of conducting their plants. Now, if that is not true we have no real reason for establishing a Government plant. That is the only reason I asked that question.

Senator PENROSE. Those matters were fully gone into last week.

Senator SWANSON. I understood from the gentleman that preceded you, Mr. Dinkey, that you would give us your estimate per ton of the cost of production of armor plate. Have you given that statement?

Mr. DINKEY. I have made up no separate piece of paper on that subject, but I am willing to say, as a matter of finding the cost of producing armor, that a reasonable figure for the unit cost is the figure which Senator Tillman's committee reported.

Senator SWANSON. How did you armor plate people ever keep your books before the Tillman report came out and fix the basis of cost? Did you not have great difficulty before that?

Mr. DINKEY. Not at all, and not now.

Senator SWANSON. That report was made last year?

Mr. DINKEY. That report was made as the result of the study of very well equipped engineers.

Senator SWANSON. That is true—by conjecture.

Mr. DINKEY. Not by conjecture—just a minute, if I may proceed. That is not conjecture. That is a judgment arrived at by men that are able to judge those things. The engineers that belong to the Navy Department in a great many cases stay with the armor plant three or four or five years. They know every one of our technical

men. They know every one of the foremen intimately. They know how many men are engaged in every building, and they know what to do. And so when they sit down and figure on the cost of a building, the number of men, and the prevailing rate of wages, and by reason of talking with our own engineers, who are compelled to be just as frank as possible with them—when they set down a statement based on that kind of consideration it will not be very far from the truth.

Senator SWANSON. What I would like to have and what I presume the committee would like to have is the estimate made by practical men engaged in the business which is the result of experience, not estimates from evidence. I would like to know from you, as a manufacturer of armor plate, at what you estimate the cost per ton of the product of the Carnegie plant when you had control of it.

Mr. DINKEY. Now, you know our difficulty about putting in a public document, available for everybody, the details of the armor business. We can not get it from Europe. We can get engineering estimates which, of course, we are able to make ourselves.

Senator POINDEXTER. The proposition is not for you to put into a public document these details, but it is to state from your own knowledge, if you can, what the cost of a ton of armor plate is. That is the result; it is not a detail.

Mr. DINKEY. That is exactly the result I can not get from any other armor maker. And I can not get any closer engineering estimate, and I think that is the most available figure for all.

Senator SWANSON. I understood you gentlemen were desirous of showing us from your books and your practical experience as manufacturers that there was not any excessive profit in the manufacture of armor plate so as to justify the Government to construct an armor-plate factory. To answer that, we asked you to give us the estimate made to your directors, or your own individual estimate of what it has cost you to manufacture this armor plate you have sold to the Government. You reply to that by giving us an estimated cost by our own engineers.

Mr. DINKEY. I have not answered your whole question.

Senator SWANSON. I would be very glad to get your answer.

Mr. DINKEY. I have it with me. The figures I have given you are such figures as you are justified in using, because they are made by engineers engaged in the business. Now, I have here the cost of the last two contracts for armor, taken from our books by Barrow, Wade, Guthrie & Co., and if it is not required to be a public document I am perfectly willing to hand it to you.

Senator POINDEXTER. Do you object to stating the total cost per ton, without going into the details of it?

Mr. DINKEY. No, I do not object to that; but I think you ought not to use a manufacturer's figures in a public document. I am perfectly willing to give you engineering figures which I have spent almost all my life at and which are bound to be true.

Senator POINDEXTER. For one, I think that is quite a reasonable attitude—not desiring to put the details in. But I can not see any reason, though there may be one, why you should object to giving the total cost.

Mr. DINKEY. From the standpoint of the manufacturer, I do not think it is reasonable to ask him in any public way to put down his actual cost. I do not think that is reasonable. Before these engi-

neering estimates were completed I sent to the Secretary of the Navy practically the same information for his own use and asked him to return it to the Carnegie Steel Co.; not to copy it, but to show if his engineers' reports were in harmony with existing facts.

Senator SWANSON. How much was the last contract for? How many tons?

Mr. DINKEY. About 15,000 tons.

Mr. BARBA. That is the one just completed, for three ships.

Senator SWANSON. Does that estimate show your plant working at full capacity?

Mr. DINKEY. Certainly not.

Senator SWANSON. Three thousand tons, was it?

Mr. BARBA. The *Pennsylvania* and *Arizona* armor only.

Mr. DINKEY. About 3,000 tons during that year. It shows what it cost to make that armor.

Senator SWANSON. That is about half the capacity of the plant? Did your plant ever have a contract that gave it full capacity for a year?

Mr. BARBA. No.

Senator SWANSON. What was the largest contract your company ever had?

Mr. BARBA. Will you permit me to answer that question? The nearest approach the Midvale Co. has had to a full year's business was the contract let in 1914 for the *Mississippi*. Midvale was given all of the armor for the *Mississippi*, amounting to about 8,500 tons. We began melting in November, 1914, and we completed melting September 28, 1915—11 months. The plant has produced no armor since September 28, 1915.

Senator SWANSON. Could you give us a statement as to the profits for that year, 1914, and the cost?

Mr. BARBA. We can give you that on the completion of this contract. We have just shipped the eleventh group. The twelfth group is approaching completion, and the thirteenth will be shipped early in March. Until three weeks after the shipment of that last group we can not produce the figures for the whole of that contract.

So when I state that we are idle, you must remember that there are spread over seven months from the beginning of the thing, a series of operations to the shipment of the armor. Now, in September we finished the last of the first stage. In March we shall finish the last operation of that last group. So the early stages of the manufacture of armor in our plant have been idle since September 28.

Senator SWANSON. As I understand, the Midvale Co. keeps a separate account for its transactions in connection with armor plate?

Mr. DINKEY. Yes, sir.

Senator SWANSON. And its losses involved in every item?

Mr. DINKEY. Certainly.

Senator SWANSON. Have you any objection to furnishing a summary of that to the committee?

Mr. DINKEY. If it is to be made a part of a printed document; yes.

Senator SWANSON. What objection have you to furnishing the summary, since the law requires most corporations to give publicity to their profits and losses anyway; none of your manufacturing secrets, but just a summary of what your books disclose in connection with armor-plate transactions in that plant. What is your objection to doing that?

Mr. DINKEY. Surely; we are perfectly willing to give you a balance sheet.

Senator SWANSON. A balance sheet each year in connection with armor-plate transactions, as shown by your books?

Mr. DINKEY. That is almost impossible, to separate that from the company's books and make a separate balance sheet of an item.

Senator SWANSON. I understood Mr. Barba to say that that was kept entirely separate from the other transactions.

Mr. DINKEY. The cost accounting is. Of course, the closing out of the books into a balance sheet is not kept separate. That is done at the end of the year.

Senator SWANSON. What I want——

Mr. DINKEY. You want the cost of armor in that plant.

Senator SWANSON. I would like to know what your books disclose each year as to the profits and losses in connection with the manufacture of armor plate; that branch of your business. I understood Mr. Barba to say you kept it separate.

Mr. BARBA. We do not keep it as a ledger account, but we do keep it so that every item of the cost, both productive and administrative, is to be obtained from the books.

Senator LEWIS. Mr. Barba, may I be permitted a question? It is my viewpoint—it was before this began, and it continues—that this whole inquiry turns on one single thing more than any other. That is, that you gentlemen estimate your cost upon what you believe to be the volume of your custom; that if you had a customer that you were sure of all the year around, giving you business sufficient to occupy that plant and keep it going, your price would be one thing, because in that way you would not have to measure the length of time in which you would not be occupied; whereas, on the other hand, where you have no certainty of your customer for an assured length of time, that enters into the estimated cost of your undertaking.

Mr. BARBA. You are correct, Senator Lewis, except that for “estimated” I would substitute “determined,” because costs are determined and not estimated.

Senator SWANSON. You will submit those estimates to the committee, which they can consider in an executive capacity, and then they will determine whether to accept them secretly or whether they can not do it. The committee can do that, can they not, Mr. Chairman? He says he is willing to turn over to the committee these estimates he has made. He can give them to the secretary of the committee, I presume, and then when we have an executive session we can determine whether we will take them secretly or refuse to receive them unless they are made public.

Senator CLAPP. Mr. Chairman, I think I shall enter a protest against receiving anything that we are not at liberty to make public.

Senator SWANSON. None of us will receive it. Let him turn it over to the secretary.

Senator CLAPP. No; it will be here for us to determine whether we shall receive it. Let us determine that. I, for one, am not going to be the recipient of information in a public matter in which the public is interested that I can not give to the public.

Senator PITTMAN. It would be valueless to us any way, because we are going to report to the Senate, and our report must be based

upon the facts we obtain here. Now, if these facts are to be given thus secretly we can not use them before Congress in support of or against this bill.

Mr. DINKEY. Gentlemen, I do not think that a set of figures by a public accountant, showing operations on two contracts in our plant, will be as useful for your purpose as the costs determined by practical engineers. If I were going before our board to present a question as to whether we would go into the manufacture of some new line, the most valuable figures for that board to consider would be the estimates of cost of production that the engineer makes. Figures from the books of some competing concern might be interesting; they would not be the deciding factor.

Senator PENROSE. Mr. Chairman, it seems to me if we followed the practice of past years, we would not go far astray. Have these gentlemen see the Secretary of the Navy and go over these figures and accountants' confidential reports; and then let us hear the Secretary of the Navy's opinion about the matter. I should say that every Senator here concedes that it is hardly fair to ask these gentlemen to give away their trade secrets, especially as one important competitor is not represented here at all—the Carnegie Steel Co.

Senator SWANSON. No member of the committee has insisted that they give away their trade secrets.

Senator PENROSE. I say, the committee agrees on it. Why not let them go up to the Navy Department, talk it all over with Secretary Daniels, and let the Secretary come down here. Very likely all of the members of the committee, except the chairman and myself, who have been studying the subject for a great number of years, would be glad to have the information we could thus obtain. Let the Secretary of the Navy come down and give his opinion direct to us. It seems to me that is the practical way of getting at it.

Senator CLAPP. Mr. Chairman, of course, trade secrets are one thing. These companies are appealing to us on the theory that the Government encouraged them to go into this business. They base their claim that the public should bear something of the burden upon the idea that these gentlemen were induced to go into this business and invest capital, on the suggestion and invitation of the Government. That makes the public a party in interest here, and I think the public have a right, when these men appeal to the public to bear a burden, at least upon that kind of a relation, to know what that burden is.

Senator PENROSE. But, Senator Clapp, you have to remember that all foreign manufacturers could get these figures, which is very unfair to the American manufacturers. They can not get the confidential foreign figures. These gentlemen are willing to take you individually into a room and show you everything, or, what would be the usual way, thrash it out with the Secretary of the Navy. It is an international proposition. England, France, and Germany make armor plate, and the keenest rivalry has always existed about patents and trade secrets.

Senator SWANSON. We have not asked them to give us any of their trade secrets; we have not insisted on that. All that I have insisted on is, why should they take an estimate of cost made by a board, when they themselves have engaged in the business for 10

or 15 years, and will not give us their costs that they have made out from their experience.

Senator POINDEXTER. Why not let the matter go at that? Mr. Dinkey is probably the most responsible of these representatives. He is president of one of the chief armor plate factories, and he says, for reasons satisfactory to himself, they do not desire to give the cost. They are showing an attitude which they have assumed heretofore, and, the purpose of the committee being to ascertain the cost, it seems to me that it practically ends the hearing. What is the use of further hearing?

Senator SWANSON. And, in addition to that, I simply asked them to give their experience in the handling of armor—what it costs to manufacture and what it sold for—to find out the profits, as shown by their business activities—not any manufacturing secrets, not any process, but just simply to show how much money they have made or lost by this contract with the Navy.

Mr. DINKEY. Gentlemen, you have apparently made me say I am unwilling to give you that figure. I am not unwilling to give you that figure. I have with me here the report of Barrow, Wade, Guthrie & Co., made for the benefit of the company, covering our experience with the two contracts; but, I submit it is not fair to use that in the form of a public document. It is available as a private matter, and when you make a report you can use the figures which fairly reliable engineers have made, as the expected cost of armor in any plant.

Senator SWANSON. We are simply agents of the Senate, to gather information and make a report to the Senate; and it has been properly said that we can not use information that we can not divulge to our principals, who are the Senate, and reach a conclusion in reporting this bill. We have not asked you for any information except such as could be used as agents of the Senate.

Mr. DINKEY. Yes, but we are offering to make available for your use the information you are asking for.

Senator SWANSON. Of course, the Navy Department is entirely independent of the Senate, but we would like for you to fix that report so as to eliminate all your trade secrets and manufacturing secrets, and leave in it such parts as will show the profit or loss of your transactions with the Government.

Mr. DINKEY. If you were a practical manufacturer, you would know that one of the fundamental things after a process has been developed is the cost of production.

Senator SWANSON. We do not ask you to give us all the items. If you were to give them to us, we would not understand them.

Mr. DINKEY. You can not, but there are people engaged in our line of business who can.

Senator SWANSON. We ask you to eliminate the parts that the other people can understand.

Mr. DINKEY. They have very keen minds, and I would like to see anyone fix up a statement that would eliminate those things. They have very keen minds.

Senator SWANSON. If I mistake not, you have equal keenness with them.

Mr. DINKEY. We have been in contact with them a great many years, so we know that they have keen minds.

Senator SWANSON. The purpose of this investigation, and of this hearing, as I understood from the Senator from Pennsylvania, was to show by the transactions, by the opening of the books, by full and complete information that there had been no excessive profits made on the sale of armor plate, and that this would be done not by conjectures here of our engineering board. We have had all that before. We had all this argument, that you need not to put in this, and did not include this and did not include that; but we had an idea that there would be full light, from actual experience and transactions, thrown on this subject, and we would be given full information. We do not want you to give us any information that is any of your trade secrets, but we would like to have information from your books, from your annual reports, from your transactions with the Government, so that we can reach a conclusion as to whether you have been charging the Government an excessive price for this armor. That is the issue before us.

Mr. DINKEY. I do not think it is a hopeless situation, but it is difficult. In the Bureau of Corporations, any information they get with respect to the figures which corporations are bound to expose, they do not permit to go to the public.

Senator SWANSON. It is for you gentlemen to determine as to whether you want the public idea which prevails, that an excessive price has been charged, to continue, or whether you gentlemen feel justified, in the armor-plate business, the product of which the Government is the sole purchaser, in giving us full information so that we can reach a definite conclusion as to that question, which has been agitating us here for 15 or 20 years.

Mr. DINKEY. I have done two things: I have stated under oath what I considered to be a carefully made engineering estimate, by a group of men whom I know know their business, and I have made the calculation, which shows not only what could have been made if the plant had run full every month but the largest sum which we could have made, and it is only 12 per cent, and the sum which we actually do make, when we run as we run, which is a little less than 6 per cent.

Then, on top of that, I am willing to show to any person, if I am permitted to do it in such a manner that it does not become a public document, the figures which are produced by Barrow, Wade, Guthrie & Co.

Senator CHILTON. Are Barrow, Wade & Guthrie accountants?

Mr. DINKEY. They are chartered accountants in New York.

Senator CHILTON. Let me see if I understand you now, Mr. Dinkey, as to what you are willing to do. Are you willing to give those figures to the committee and suggest to us what shall be done with them, and let the Senate tell us what shall be done with them.

Mr. DINKEY. Congress, in arranging the Bureau of Corporations, does not permit to be made public information taken from the books of the companies.

Senator CHILTON. That is very proper.

Mr. DINKEY. I would like to have that same safeguard around this portion of the public business.

Senator CLAPP. You forget, however, that here we are a party to the contract. In the Bureau of Corporations the bureau is not conducting any business for the Government.

Mr. DINKEY. It is in the public interest, just like this is.

Senator CLAPP. It is in the public interest, so far as the conduct of the corporation is concerned, but here you are asking the public to bear a burden, the cost of this armor plate. I do not want to press anyone unfairly, but it does strike me that where you come to the public—and this committee is the public—and ask them to bear a burden, based upon a somewhat implied or sought to be established condition between you and the Government, upon the encouragement of the Government, that the public has got a right to know just what this armor plate is costing.

Senator CHILTON. Will you allow me to finish my examination?

Senator CLAPP. That is the difference between our attitude in this matter and the attitude of the Bureau of Corporations in regulating the internal affairs and the methods of corporations.

Senator POINDEXTER. If the chairman will allow me just a moment to corroborate what Senator Clapp has just said, I would like to read the attitude taken by the Navy Department in 1897. The same identical point is made by Secretary Herbert. He says:

The Carnegie Co. replied entirely by correspondence. Mr. Linderman, president of the Bethlehem Co., eventually came to the department for a conference, all of which was taken down stenographically and is also appended as Exhibit No. 3. The result in both cases was a failure at that time to get any of the information desired, both companies contending that the Government had no right to inquire into their private concerns, or to ask them to exhibit to the public the secrets of their business, which they maintained were their own.

In my opinion, this position of the contractors was not well taken. I stated to Mr. Linderman that the Government had bound itself not to go abroad for armor; that this meant that it was to buy from the two American companies which make it; that the Government, therefore, as one party to these contracts, had a right to know whether the prices charged by the other party were reasonable, etc.

In reply to a question, I said to him that while the information upon which conclusions might be reached could not be withheld from Congress, that any manufacturing secrets that might be disclosed would not be revealed. In point of fact, however, it is not believed that there are any secrets connected with the manufacture of armor, as such, that are not now known to the department through its ordnance officers, and it is to be especially noted that secrets, if any there are appertaining to the business of manufacturing either steel or armor, would not be apparent upon the books of account, and it was these to which access was desirable to enable me to reach correct conclusions.

Mr. Chairman, I ask to have entered in the hearings, and made a part of the hearings, the report of Secretary of the Navy Herbert, of date January 31, 1896, part of which I read.

The CHAIRMAN. It will be inserted in the record.

(The document submitted by Senator Poindexter is as follows:)

[Extract from House Document No. 151, Fifty-fourth Congress, second session.]

COST OF ARMOR PLATE.

LETTER FROM THE SECRETARY OF THE NAVY, COMPLYING WITH THE PROVISION OF THE NAVAL APPROPRIATION BILL APPROVED JUNE 10, 1896, REGARDING THE COST AND PRICES OF ARMOR PLATE.

NAVY DEPARTMENT.

Washington, D. C., December 31, 1896.

SIR: In the act making appropriations for the naval service for the year ending June 30, 1897, approved June 10, 1896, it was enacted that—

“*And provided further*, That the Secretary of the Navy is hereby directed to examine into the actual cost of armor plate and the price for the same which should be equitably paid and shall report the result of his investigation to Congress at its next session at a date not later than January first, eighteen hundred and ninety-seven and no

contract for armor plate for the vessels authorized by this act shall be made till after such report is made to Congress for its action."

In compliance with this provision of the act I have the honor to transmit herewith my report

Very respectfully,

H. A. HERBERT,
Secretary of the Navy.

Hon. THOMAS B. REED,
Speaker of the House of Representatives.

The Senate and House of Representatives in Congress assembled:

The act making appropriations for the naval service for the fiscal year ending June 30, 1897, approved June 10, 1896, provided:

"That the Secretary of the Navy is hereby directed to examine into the actual cost of armor plate and the price for the same which should be equitably paid, and shall report the result of his investigation to Congress at its next session at a date not later than January first, eighteen hundred and ninety-seven; and no contract for armor plate for the vessels authorized by this act shall be made until after such report is made to Congress for its action."

This provision of law was construed as imposing a duty which was to be performed by me individually. I, however, associated with myself as advisers Capt. W. T. Sampson, Chief of the Bureau of Ordnance, and Chief Constructor Philip Hichborn, Chief of the Bureau of Construction and Repair, who have throughout this investigation rendered me much useful assistance.

The law vests in me no power to administer oaths or to summon before me witnesses.

The following sources of information appeared open:

1. The contractors for armor. They, of course, could, if so disposed, give full and accurate information as to the cost of their plants and of the manufacture of armor.
2. The naval officers who had been stationed at the works of the armor manufacturers as inspectors. These officers did not have access to the books of the contractors, and could not be expected to give very accurate information as to the cost of plant, but they had opportunities to know about the cost of material, and the character and amount of labor employed, and they had been, such of them as were on duty at the works when the Senate committee began its investigations into the price of armor last winter, especially charged by the department with the duty of observing and ascertaining, as far as practicable, the prices of labor, cost of material, etc.; they had collected much valuable information on all these points. Indeed, they were familiar with the processes of manufacture in every stage, and there were, it is believed, no secrets connected with the manufacture of armor with which they were not acquainted.
3. The prices of armor abroad, though already known in great part, could be more thoroughly inquired into and compared with the prices being paid by the Government.
4. The cost of erecting the armor plants, which was a material portion of the inquiry, could not be ascertained with absolute accuracy without an inspection of the books of the contractors. If they should fail to furnish the proper information, an inquiry into the price at which similar plants could at present be erected would throw light upon the subject. This inquiry into the present cost of erecting armor plants seemed to be all the more material because the Committee on Naval Affairs of the United States Senate, when it began the investigation which resulted in the enactment of the law calling for this report, had before it the proposition that the Government itself should erect a plant for the purpose of manufacturing its own armor.
5. Search could be instituted for any reports made to State authorities by the two contracting companies under the laws of their State.

All these sources of information have been applied to, and the inquiries which were set on foot immediately after the enactment of the law have been prosecuted diligently.

Immediately after the passage of the law, letters were written to Lieut. Commander W. S. Cowles, naval attaché to the United States Embassy at London, and Lieut. Commander R. P. Rodgers, naval attaché to the United States Embassy at Paris, instructing them to secure further and additional information as to the prices paid for armor to European manufacturers, and as to the cost of establishing armor plants like those of the two American companies, and with the view of aiding in these inquiries, and also of ascertaining, if possible, whether it was true, as had been charged in the Senate debate last spring, that there was an agreement or understanding existing between the manufacturers of armor in this country and in Europe, the purpose of which was to keep up the prices of armor, I made a personal visit during the past summer to France and England. Armor plants and machine shops were visited, and inquiries were set on foot while I was there, which resulted in the obtaining of two

estimates of the cost of establishing armor plants, one of which was made in England and the other in France, which are hereto attached, marked Exhibits No. 1 and No. 2, respectively.

At the outset of this investigation, and in order to enable me to more readily understand the testimony which it would be necessary to take in this matter, I visited the Carnegie armor plant in July, 1896. The officials of the company courteously showed me over the works and explained the methods of manufacturing. I had some years before visited the Bethlehem works. One who witnesses the methods employed in the manufacture of armor at these plants is much impressed with the fact that relatively very little manual labor is required in the processes adopted. Very few employees are needed to put in motion the immense machines which handle the material and do the work. From this it follows that by far the most important single feature in this investigation is the cost of this machinery.

On the 13th day of June, 1896, the following letter was written to the president of the Bethlehem Co. and also one of like tenor to the Carnegie Co.:

NAVY DEPARTMENT,
Washington, June 13, 1896.

SIR: In the act making appropriations for the Naval Service for the fiscal year ending June 30, 1897, and for other purposes, approved June 10, 1896, it is provided "that the Secretary of the Navy is hereby directed to examine into the actual cost of armor plate and the price for the same which should be equitably paid, and shall report the result of his investigation to Congress at its next session at a date not later than January 1, 1897; and no contract for armor plate for the vessels authorized by this act shall be made until after such report is made to Congress for its action."

In discharging the duty thus imposed upon me by Congress I shall be glad to have such assistance as you may be able to render me. If it be convenient for you to attend at this time, I will be pleased to have you come to my office in the Navy Department on Saturday the 20th instant, with such of the officers and employees of your company as may be able to aid you in this matter, and prepared to furnish me with such facts and figures relating to the subject matter of the inquiry to be pursued as will tend to aid me in arriving at a conclusion which shall be just and fair to the company you represent and to the Government.

In conclusion permit me to express the hope that I shall have your hearty cooperation in the discharge of the delicate duties imposed upon me by this act of Congress.

I have written to Mr. Leishman, of the Carnegie Co., a letter similar to this, requesting his appearance on Wednesday, the 17th instant.

Very respectfully,

H. A. HERBERT, *Secretary.*

ROBERT P. LINDERMAN,
President Bethlehem Iron Co., South Bethlehem, Pa.

The Carnegie Co. replied entirely by correspondence. Mr. Linderman, president of the Bethlehem Co., eventually came to the department for a conference, all of which was taken down stenographically and is also appended as Exhibit No. 3. The result in both cases was a failure at that time to get any of the information desired, both companies contending that the Government had no right to inquire into their private concerns, or to ask them to exhibit to the public the secrets of their business, which they maintained were their own.

In my opinion, this position of the contractors was not well taken. I stated to Mr. Linderman that the Government had bound itself not to go abroad for armor; that this meant that it was to buy from the two American companies which make it; that the Government, therefore, as one party to these contracts, had a right to know whether the prices charged by the other party were reasonable, etc.

In reply to a question, I said to him that while the information upon which conclusions might be reached could not be withheld from Congress, that any manufacturing secrets that might be disclosed would not be revealed. In point of fact, however, it is not believed that there are any secrets connected with the manufacture of armor, as such, that are not known to the department through its ordnance officers, and it is to be especially noted that secrets, if any there are appertaining to the business of manufacturing either steel or armor, would not be apparent upon the books of account, and it was these to which access was desirable to enable me to reach correct conclusions.

Finding that no information was likely to be furnished by the contractors, I called before me Lieuts. Rohrer, Niles, and Ackerman, who had all been at the works of the Bethlehem Co. as inspectors, and orally instructed them to make me a written report, giving their estimates separately or together as they might conclude, of the cost of manufacturing armor; and they made two reports. The first report is hereto attached, marked "Exhibit No. 4." The second is not attached, because it was an

attempt to state an account with the Bethlehem Co. and was not used by me, for the reason that in my opinion it was not based upon proper methods, and also because the figures subsequently obtained at Harrisburg rendered such an account unnecessary. This statement is, however, on hand if desired.

Lieut. Commander Rodgers, who had been an inspector at the Bethlehem Iron Works from March 1, 1895, to December 23, 1896, was also called upon to make separately his estimate of the cost of manufacturing armor, and his report is hereto appended, marked "Exhibit No. 5."

Ensign McVay, at present stationed at the Carnegie works, was also instructed to observe, inquire, and report his estimate as to the cost of manufacturing armor at the works of that company, which is hereto appended, marked "Exhibit No. 6."

It should be observed that the Bethlehem Co. was the first to contract with the Government for armor. This company made a contract with the United States Government for a quantity of armor and gun steel on the 1st day of June, 1887, and with the plants erected under these contracts it has manufactured armor for this Government and for Russia, and gun steel for the United States Navy and the United States Army. The Carnegie Co. erected its plant under a contract made with Secretary Tracy, on the 20th day of November, 1890, and with this plant it has made armor for this Government and some also for the Russian Government. The Bethlehem Co. being the first to establish an armor plant in this country naturally made some costly experiments, and its plant was therefore more expensive than that of the Carnegie Co. Leaving out of consideration the cost of plant, it is believed that the cost of manufacturing armor at the two establishments is about the same, minus a small difference in favor of the Carnegie Co., noted in some reports, resulting from cheaper coal.

RULES IN ACCORDANCE WITH WHICH CONCLUSIONS HAVE BEEN REACHED.

In considering this matter I have been guided by the following considerations:

1. A Government contractor should be liberally treated. He does not stand on an equal footing with the other party. To illustrate: Contracts for such material as armor always contain provisions authorizing the Government to modify its specifications, and in such cases to appoint a board of its own officers to decide questions of increase or decrease of cost. Government inspection is usually much more rigid than is required in ordinary commercial transactions. Such considerations as these, no doubt, often deter those who are already doing a profitable business from taking Government contracts. The Government, therefore, as an inducement, should pay liberal prices, so as to entitle itself to the best services.

2. If contractors who have invested large amounts of money on the faith of Government contracts shall be unfairly treated and ruined by the exercise of the sovereign power of the Government, the natural result will be that only the hope of the most extravagant profits will tempt manufacturers to make Government contracts. On the other hand, liberal treatment of contractors by the Government, coupled with a prompt payment for work, ought always to enable it to procure the best articles at fair prices.

3. The two armor contractors, the Bethlehem Iron Co. and the Carnegie Steel Co. (Ltd.), each invested a large amount of money in the plant necessary to manufacture armor. Only Governments require armor plates, and there was at the date when these two companies undertook to erect their plants but little prospect that either of them would ever make armor for foreign Governments. It is also to be remembered that they both entered upon the business at the request of the Navy Department. Neither of them had any expectation that its first contract would insure full payment for its plant. They both, therefore, when embarking upon this manufacture, encountered the risk of a failure of the Government to authorize and build other armored vessels. If the Congress had failed, after the making of the original contracts with these parties, to authorize other armored vessels, the loss to each of these contractors probably have been considerable. It was natural, therefore, that profits under the first contracts should be large. The risk involved was an element to be taken into consideration in fixing prices.

4. On the other hand, when these transactions are looked at from the present standpoint, it appears that not only have the original contracts made by both these companies been practically completed and the moneys paid thereon, but that each of them has been given other armor, the manufacture of which will fairly occupy it until June 1, 1897, although they are allowed by their contracts until January 1, 1898. There is, therefore, from the present standpoint, no uncertainty whatever about the volume of the Government business these two companies will have had from the dates when they began up to January 1, 1898.

In examining from the present standpoint the mutual relations between the Government and these contractors, as they are now and as they will be at the time of the fulfillment of existing contracts, there is no element whatever of uncertainty to be taken into consideration. If it shall appear that the profits already received or hereafter to be received from past and existing contracts, considered together, are or will be sufficient to pay these companies a fair percentage upon their investments and to pay for their plants in whole or in part, then the fact that the plants have been or will have been so paid for, either in whole or in part, must be taken into consideration in fixing the rates that should be allowed for armor in future contracts.

It may be that the conclusion attained from a full consideration of past and present relations between these parties and the Government is to be that future prices for armor should be much lower than those now being received, yet it will not at all follow from this that prices have, up to this moment, been higher than they should have been. When a manufacturer is about to enter upon a contract with the Government to erect a special plant for the manufacture of an article needed only by the Government, and for which no other Government would probably become a customer, the amount of the demand for the article being uncertain and contingent upon the action of Congress, it can not be held unreasonable that he should expect his profits to pay him within a reasonably short period of time for a plant which would be useless in case the Government's demand upon it should cease. When, however, the time comes that the investment by such contractor in special plant has been paid for by profits, either in whole or in large part, the time has arrived for a readjustment of prices. Thereafter rates are to be computed upon a totally different basis, and when the contract relations between him and the Government are being reviewed for the purpose of reaching a basis for future prices, a contractor can not complain if the very large profits be bargained for when the future of his venture was uncertain are not allowed him in such calculation. Such present review of past transactions can furnish no reason for taking away profits already realized, but it may very properly be looked at when determining the rate of profit in future contracts. To put it in another form, a contractor might very well refuse to embark upon an enterprise, the future of which was clouded with many doubts, even upon a fair prospect of say 25 or 30 per cent profit, and yet be entirely satisfied with a profit of say 10 per cent, when the future had resolved itself into the past, and uncertainty had become certainty. Confining myself, therefore, to past and existing contracts about which there can be no doubt, I have concluded that if the Bethlehem and Carnegie Cos., up to January 1, 1898, a period at which the armor for the *Kearsarge* and *Kentucky* will all certainly have been finished, are allowed a profit of say 10 per cent upon the investments they have made for armor plants, the residue of the profits received by them severally from the manufacture of armor, due allowance being made for wear and tear, repairs, taxes, insurance, etc., ought to be applied the amortization of their investments.

I have also concluded that in ascertaining whether the armor plant of a contractor has, after allowing him reasonable profits, been paid for, it is not unjust to consider all the profits he has derived from the use of such plant, whatever be the sources from which such profits have come. To illustrate: The Bethlehem Co. contracted with the Secretary of the Navy in 1887 to furnish both armor and gun steel. The two contracts formed parts of one transaction. The company erected a gun plant and an armor plant. The two plants were contiguous, though this does not seem to be material. What did at first appear to me to be a matter of some doubt was whether in the summing up of profits derived from these plants to be set off, after allowing fair dividends on investment, against the cost of the armor plant, the profits on gun steel furnished to the United States Army, and on armor manufactured for the Russian Government could be taken into consideration in ascertaining the extent to which the company had been paid for its armor plant. I have decided this question in the affirmative.

The Government, in contracting with a manufacturer for an article he is putting on the market, and which requires no special plant, is, no more than a private individual, under obligation to see that the manufacturer makes any particular profit or that he is enabled by his contract with it to pay for any portion of his plant. Both parties in such a transaction take the ordinary chances of profit or loss. Exactly the reverse is true where the Government asks that a special plant for its own special purposes be erected. Here, the Government ought, in all its contracts, up to the point at which the manufacturer shall have recouped his original investment, to take into consideration the expenses incurred, prudently and in good faith, by the contractor in preparing himself thus to serve it. But in case the contractor uses his plant to manufacture for others, his venture becomes pro tanto a commercial enterprise and is to that extent divested of its character as a governmental agency. It would, therefore, seem clear that if by means of such commercial contracts, together with Government

contracts already enjoyed, such a plant has been paid for, there can no longer be any obligation resting on the Government to do what has already been accomplished. In other words, it is only when the Government is sole paymaster that it can be looked to for full payment.

I have, accordingly, in the estimates hereafter submitted as to the Bethlehem plant, reckoned on the profits made by that company on gun steel for the Navy and Army and on armor for the Russian Government, and the supposed profits of the Carnegie Co. from a contract it made with Russia have also been charged to that company.

It has been heretofore stated that all efforts made in June last to obtain information from the companies were fruitless. They each then replied that their directors were (some of them) absent, and that no definite replies could be expected until these directors should return from their summer outings, and they were in turn both notified that the investigation would proceed without them.

On the 25th of November, 1896, the Bethlehem Co. addressed me the following letter:

[Bethlehem Iron Co., Robt. P. Linderman, President.]

SOUTH BETHLEHEM, PA., November 25, 1896.

The SECRETARY OF THE NAVY,
Washington, D. C.

SIR: Referring to your letter addressed to this company under date of June 18, 1896, and to the writer's interview with you on the 25th of that month, we write to say that, after a very serious consideration of the subject, we feel reluctantly obliged to decline to give, in such detail as you request, the cost to us of manufacturing armor plate, since to do this would necessarily involve the disclosure to our competitors of business secrets which we have obtained by long and expensive experience and which belongs to us alone and which might be used to our disadvantage. So far as we know it is without precedent for a manufacturer to be asked to divulge the cost of his product, and we can not see that we should be asked to do so in this case.

We desire, however, to assist you as far as we consistently can in the investigation imposed upon you by the act of Congress referred to in your letter, and we therefore respectfully offer the following suggestions:

Last March, during the course of the investigation by the Committee on Naval Affairs of the United States Senate in relation to the prices paid for armor for vessels of the Navy, Commander Horace Elmer, in charge of steel inspection at the Carnegie Steel Works, and Lieut. Commander John A. Rodgers, in charge of steel inspection at these works, both stated that in their judgment the cost of the material and labor involved in the manufacture of a ton of armor amounted to \$250. This estimate does not, we presume, include the very difficult and costly shapes we are sometimes required to make.

Taking this figure, however, as a basis, but without in any way indorsing or assenting to the same, there must be added thereto, among other items of cost not taken into consideration by them:

INTEREST ON INVESTMENT, MAINTENANCE AND DEPRECIATION OF PLANT, WORKING CAPITAL.

Interest on investment.—Our plant for the manufacture of armor has cost us not less than \$4,000,000, not including interest on outlays during construction, land, railroad connections, etc., and counting at bare cash cost, without any manufacturing profit, the large part made by ourselves. Assuming that, by reason of comparatively recent improvements and extensions, our investment has only been that large for the last two and a half years, and for the two and a half years previous was but \$3,000,000, the interest during these five years would amount to \$1,050,000. During this period we made 13,411 tons of armor, including that made for the Russian Government, which would make the interest charge per ton \$78.29.

Maintenance and depreciation of plant.—Ten per cent per annum is certainly a low charge to cover these two items. Ten per cent on \$3,000,000 for two and a half years, and on \$4,000,000 for two and a half years amounts to \$1,750,000, or on 13,411 tons, to \$132.72 per ton.

Working capital.—It is extremely difficult to say exactly what is the amount of working capital locked up in this branch of our business, as it varies with the condition of the work, the orders on hand, and on a number of other factors unnecessary to enumerate, but it is safe to say that during the past five years it has not averaged less than \$1,500,000, the annual interest on which would amount to \$90,000, or \$33.55 per ton.

To recapitulate:

To the estimated cost of labor and material as made by your agents per ton. \$250. 00
Must be added:

| | | |
|-----------------------------------|--------|---------|
| Interest on cost of plant..... | do.... | 78. 29 |
| Maintenance and depreciation..... | do.... | 132. 72 |
| Working capital..... | do.... | 33. 55 |
| Total..... | do.... | 494. 56 |

There are other costs and expenses, such as loss on rejected plates, cost of experiments, administration expenses, etc., but the above is sufficient, we believe, to convince you that the prices now being paid by the Government are not excessive.

When, at the instance of the United States Government, we undertook this difficult and vexatious business, it was obvious that this could not be prudently done for the order which the Government then desired to place, but we were given to expect such further orders as the Government might have to give. The obstacles and delays that always beset the pioneer had however been overcome when the Government gave a private contract on the same terms as ours to a rival concern which, guided by our sacrifices, was spared the outlay of more than a million dollars. And now, though there is little prospect of continuous work for these two establishments, if even for one, the Government is urged to set up another to be operated by itself.

Under these circumstances we now confirm the informal suggestions made to yourself and to others, and state that we desire to withdraw from this troublesome business by selling to the Government, below cost, our entire armor-plate plant, which we believe to be the best in the world.

Respectfully,

THE BETHLEHEM IRON CO.,
ROBT. P. LINDERMAN, *President*.

It will be seen from this letter that Mr. Linderman does not commit himself to anything except, perhaps, to the methods of calculation which he suggests. He, however, consents that if his methods are adopted the plant of the Bethlehem Co. may be estimated at \$4,000,000, \$3,000,000 of which are to bear interest for five years, and \$1,000,000 for two and a half years. He also calls attention to the fact that two naval officers during the investigation of the Committee on Naval Affairs of the Senate had testified that in their judgment the costs of material and labor in a ton of armor amounted to \$250. Upon this basis he suggests the following method of calculation:

1. He claims 6 per cent interest upon the amount of his investment. Now, a manufacturer can not claim interest on his capital as distinct from profits. The net income derived from shares in such an enterprise, however large or small it may be, is profit and not interest. If Mr. Linderman means to say that in any estimate to be made the net profits allowed should be at least 6 per cent on the capital invested, this may be readily admitted. In the calculations hereafter to be made a larger per cent than this will be allowed as a rate of dividend before applying the residue of profits to the extinction of the capital invested in plant.

2. Mr. Linderman asks 10 per cent per annum for maintenance and depreciation of plant. It will be noted that the Carnegie Co., in its statement soon to follow, claims 5 per cent for "maintenance of plant," where the Bethlehem claims 10. There is no distinction to be made between the companies in this regard. Their plants are similar and are doing similar work. The difference in their estimates can only be accounted for by considering that the rule, often invoked, that 10 per cent must be allowed to a manufacturer for maintenance of plant, which includes taxes and insurance, is not of universal application. The Bethlehem Co. invokes this rule, but the Carnegie Co. asks only 5 per cent. As to the Bethlehem Co., it has not, on account of certain returns hereinafter set forth, been necessary to apply this rule at all. As to the Carnegie Co., I have made two calculations, in one using 10 per cent, in the other 5, the figure suggested by the company itself. There is little danger that this company has been unjust to itself. It is obvious that charges for maintenance must, under different circumstances, vary widely. A new and well-constructed plant will require not half so much for repairs, and may not subject the owners to one-third as much loss from stoppages as one that is old or badly constructed. So a plant composed in large part of delicate machinery, like those engaged in weaving fine fabrics, ought to cost more for repairs than a plant like those in question, which consist almost entirely of large and heavy pieces, like cranes, etc., which, if originally strong and heavy enough, would last indefinitely, if the smaller parts, like rollers, be from time to time replaced.

I have before me what are believed to be all the taxes paid by these companies, and they are so insignificant that they will be considered as included in either estimate of percentage for maintenance.

It is to be observed that Mr. Linderman claims maintenance on the cost of plant. This, of course, can not be allowed. So applied, Mr. Linderman's rule and his rate would give the Bethlehem \$100,000 more every year than would be allowed at the same rate to the Carnegie Co. for keeping a similar plant in order, as the plant of the former company, it is claimed, no doubt correctly, cost \$1,000,000 more than that of the latter. The reason on which the rule is founded could lead to no such conclusion. Under such a construction the charge for maintaining a plant would vary according to the value of the land upon which it was located, according to the good or bad bargain made in buying it, or other adventitious circumstances.

The reason of the rule is apparent from its terms, viz, an allowance for maintaining a plant, not for maintaining or keeping up the cost of a plant. The percentage allowed is therefore to be applied only to the present value of a plant, and in arriving at this value the price of land, etc., which do not need to be renewed is not estimated. This is the rule hereinafter applied.

Having determined upon allowing a percentage for maintenance, instead of apportioning it to each ton of armor, as insisted upon by Mr. Linderman, in the calculations hereinafter made a company will be credited with it during the whole period to be covered by the estimate, and this certainly can not be objected to.

3. Mr. Linderman insists that the working capital necessary is \$1,500,000, the annual interest on which would amount to \$90,000.

It is difficult to say what working capital is necessary to a manufacturer. Much depends upon the nature of the business done, whether returns are frequent or at long intervals, whether the products are for sale in the general market or manufactured to order. It would seem that \$1,500,000 would be totally unnecessary in this instance. Every group of armor consists of three or four hundred tons and is promptly paid for when delivered and tested. When 3,000 tons of armor per annum are manufactured, payments, after they begin, accrue almost monthly. When 2,000 tons are manufactured, payments accrue at least once in two months. Ten per cent, it is true, of the money due under each contract is reserved by the Government, until its complete fulfillment, but the profits on every ton of armor are great, and they afford much ready money with which to pay for labor and material, and all this must be taken into consideration in determining upon the amount to be allowed. As to future contracts, including the *Kearsarge* and *Kentucky*, progress payments will be made, rendering necessary still less working capital than now. The Carnegie Co., which claims that calculations should be made very much as is contended for by Mr. Linderman, only insists upon \$1,000,000 of working capital. It may be that when a contract is entered upon, as some months must elapse before the first deliveries, \$1,000,000 may be employed for a time as working capital, but certainly no such sum can be needed throughout any considerable period in such a business as manufacturing for a customer who pays promptly at short intervals, and when in every payment there is a very large profit. It is believed that \$750,000 as working capital will be a liberal allowance.

About the time of the receipt of the above letter from the Bethlehem Co. the following communication came from the Carnegie Co.:

“THE CARNEGIE STEEL CO. (LTD.).

“We regret to be compelled to decline any request you make, but believe that upon due reflection you will see that it is impossible for us to open the details of our private business to the eyes of our competitors and to the world.

“The cost of making armor is not to be found in the details at the shops, upon which your officers have estimated. Permit us to show you three, among the many, elements of cost which they did not take into account:

“First. The capital we have invested in our armor plant is, as stated by our Mr. Carnegie in his evidence before the Senate Naval Committee, fully \$3,000,000. We charged to this account in our books only \$2,500,000, the amount paid out; but we ourselves contributed fully \$500,000. No charge was made for the ground, railway connections, etc. The water supply is taken from our other works; so also are the electric light and power currents; no charge was made for the proportion of these plants necessary for the armor-plate plant. We charged nothing for superintendence, nor for interest during construction. All of these are legitimate charges and bring the total cost up to something over \$3,000,000.

“We began making armor plate in October, 1891, and have made to August 1, 1896, 11,039 tons of armor. The interest upon our investment, \$180,000 per year, in five years amounts to \$900,000, or \$81.53 per ton of armor.

"Second. The estimate made by your officers took no account of maintenance of plant. This can not be estimated at less than 5 per cent per annum, which makes \$150,000 per year, or for five years \$750,000, amounting to \$67.94 per ton of armor.

"Third. The armor plant is practically useless except for the making of armor; therefore, when the Navy is finished—say, 10 years hence—we have to face a probable loss of the cost of the plant, \$3,000,000. Even if the salvage amounts to \$500,000, we have a loss of \$2,500,000, equaling in 15 years \$166,666 per annum, or \$75.49 per ton of armor.

"This will make items of cost which were not taken into account in the estimate of your officers, as follows:

| | |
|--|---------|
| Interest on plant, per ton of armor | \$81.53 |
| Maintenance of plant, per ton of armor | 67.94 |
| Loss by abandonment of plant when Navy shall have been completed, per ton of armor | 75.49 |
| Total | 224.96 |

"To the above should be added the cost of working capital, which varies greatly, as works may be run fully, partially, or not at all, but, estimated at \$1,000,000 average, the cost is, say, \$25 per ton.

"It is because of these and other facts that we do not hesitate to say that the manufacture of armor is not, and can not be made, a permanently satisfactory investment of capital, even at the prices charged per ton.

"We did not seek the Government orders for armor; the Government sought us, and, after declining when invited, we finally agreed reluctantly to undertake the task, simply because the Government could not get armor for the ships which were upon the stocks waiting for it.

"If the Government now desires to undertake the manufacture of armor for itself, we shall only be too happy to sell our plant to it at cost. It is in splendid order, and we refer you to your experts as to whether it is not far more efficient now than when new, as we have continually made improvements upon it.

"The plant can remain where it is, and we will undertake to furnish the steel in the ingot at a price to be fixed by three arbitrators; or we will remove the plant and erect it at any point designated by the Government; also erect the additional plant for the making of the steel. We will superintend all this and start the works and continue to operate them until they produce armor successfully; and for all this we will only ask the Government to pay the actual cost.

"We undertake also to teach the Government officials how to make such armor as we are now supplying you, which, as you know, holds the world's record.

"Having gone into this business primarily to help the Government when it could not obtain armor, we submit to you and to Congress that we have some claim upon the Government to take our plant at cost, and we hope this proposition will meet with favor.

"We make about 150,000 tons of finished steel per month, and the two or three hundred tons of armor we make per month demand greater attention and give more trouble than all the 150,000 tons. We shall be delighted if the Government will let us out of the armor business. We can use the capital in several lines of our business to better advantage."

It will be seen that the claim of this company is that its investment in plant should be taken at \$3,000,000. It insists also on interest on its investment at the rate of 6 per cent for the full time of five years. Like the Bethlehem, this company would add to the price of armor paid for in the last part of the period interest that accrued on capital, a part of which was already extinguished, to increase its price. While demanding for itself all this interest, the Government is allowed no interest on its payments. To adopt such a rule as this would be to say that although it might appear that when one-half of these five years had elapsed the capital originally invested had been 30, 40, or 50 per cent of it repaid by profits received over and above fair dividends, yet we must go on counting interest on the whole amount, no matter how much of it had been paid back.

The company does, however, admit the possibility of some "salvage" by its third proposition, "That the armor plant is practically useless except for the making of armor. Therefore, when the Navy is finished—say, 10 years hence—we have to face a probable loss of the cost of the plant, \$3,000,000. Even if the salvage amounts to \$500,000, we have a loss of \$2,500,000, equaling in 15 years \$166,666 per annum, or \$75.49 per ton of armor."

It seems to be very plain that no assistance at arriving at a correct conclusion in the premises can be derived from either of these letters, unless it shall be concluded

that the cost of the plant is in the one case \$4,000,000 and in the other \$3,000,000, as insisted upon.

The amounts of these investments, as has heretofore been stated, is most material, and I have diligently sought to secure evidence that would enable me to estimate them correctly. In discussing the weight to be given to the statements made by the companies, consideration is to be given the following facts:

1. These companies are testifying in their own interests.

2. They are in possession of evidence which would, if produced, satisfy Congress of the correctness of their statements. They have been requested to produce this evidence, and they refuse to do it. The general ground upon which these companies refuse to show their books, or to explain otherwise the costs to them of the manufacture of armor, is that this would be to expose their business secrets to the competitors. It would appear that they might give evidence as to the value of their plants without exposing their business methods. Certainly the prices of such portions of these plants as were purchased might be proven by vouchers, and details of the items constituting the remainder might be set forth so as to enable Congress to see what had been included and to form for itself some opinion. It is not easy to see how this would be giving away business secrets. Nevertheless, all important as is the question of the cost of these plants, we have on that subject only a bare statement by each of these companies, neither of them going into any particulars or giving any such explanations as are usually required in courts and before committees when facts are to be established.

These statements, while both of them mentioning items which are not included in the sums mentioned, do not either of them specify what items are comprised in the cost of their plants. Both of these plants are connected with steel mills, and the armor and steel plants are necessarily to some extent interdependent. If the figures in the books of these companies, when making up amounts chargeable to armor plant, proceed upon bases as incorrect as the methods suggested in each of these letters for calculating the cost of armor—and this would seem to be a reasonable presumption—then the statements as to the cost of these plants are to be taken with many grains of allowance.

It is also to be noted that if the plants of these two companies cost \$3,000,000 and \$4,000,000 each, proof of these figures in such manner as to satisfy Congress and the public would have a wholesome effect upon business competitors in deterring them from entering into competition in the manufacture of armor.

Examining the estimates of the cost of plants made by the Government inspectors, we find that Ensign McVay, in his prepared statement of the cost of the plant at the Carnegie works, estimated it altogether at \$3,000,000, the same figure given by the company. In the company's statement it said that the \$2,500,000 shown by the books does not include ground, railway connection, water plant, or electric light and power currents; that these are taken from the other works, and that, together with the interest during the construction of the plant, they will amount to something over \$500,000. Mr. McVay only reached \$3,000,000 by including these items:

| | |
|--------------------------------|-------------|
| Power house at..... | \$75, 000 |
| Pumping station, etc., at..... | 75, 000 |
| Electric plant at..... | 75, 000 |
| Land at..... | 550, 000 |
| Stock on hand at..... | 300, 000 |
| Total..... | 1, 075, 000 |

Deducting this from \$3,000,000 leaves \$1,925,000 for the items which are estimated by the company at \$2,500,000. The stock on hand, \$300,000, is clearly improperly included by Mr. McVay in plant. His testimony, therefore, does not sustain the company. It is to be considered, however, that naval officers have really very little knowledge as to the cost of plant. They must, in all their estimates, be governed largely by such data as they are able to collect from observation and hearsay. As to the amount of labor employed and of fuel and material used in the manufacture of armor, they have observed closely, and, as the market rates for these are accessible, they may be expected to estimate them with reasonable accuracy. There is, however, no general market in this country for the structures constituting an armor plant. The inspectors must, necessarily, in order to form any opinion whatever of the value of these, be guided largely by such hearsay information as they can obtain, and this must, of course, come primarily in large part from the interested persons with whom these officers are bought in contact around the works.

Coming now to the estimate for the armor plant of the Bethlehem Co., the Rohrer Board estimates this plant altogether at \$4,881,000, or \$881,000 more than the \$4,000,000

upon the basis of which the company indicates its willingness to have estimates made, provided calculations proceed upon methods suggested by it, which methods have been shown to be grossly erroneous. There is no doubt but that the Bethlehem Co.'s plant did cost very much more than the plant of the Carnegie Co. At Bethlehem a hammer was constructed at large cost, which rumor has placed at amounts varying from \$400,000 to \$700,000. The use of this hammer was subsequently abandoned, because the press which was erected did better and cheaper work. Other experiments were made which were futile and costly. It is believed that it would not be unjust to allow in these estimates \$1,000,000 more for the plant at Bethlehem than for that at Carnegie's, but here, as everywhere throughout these investigations, we are met with the difficulty of arriving at any correct conclusions in the absence of the positive, direct, detailed evidence which could be furnished by the companies themselves, but which they refuse to give, preferring, as they do, to leave the department and Congress to speculate on the subject in so far as it may not choose to be guided by the very general statements which have been made in these letters.

Even these letters were not written until after I had returned from Europe, where by my visit I procured, as stated, two estimates of the cost of armor plants. One of them was made in England by a company which is prepared to furnish the plant, and it is attached hereto, marked "Exhibit No. 1." This estimate by a manufacturer of experience and reputation puts as a sufficient sum for machinery £113,400, but it having been referred to the Chief of the Bureau of Ordnance to be completed by adding estimates for duties, buildings, installation, etc., he has added these and other costly items which he deems necessary to make it equal the American plants. As thus completed, it amounts to \$1,590,000. This is the estimate for putting up complete a plant equal to that of the Carnegie Co., said to have cost \$3,000,000. Prices are, however, lower now than in 1887, when the Bethlehem Co. began its plant, or even than in 1890, when the Carnegie Co. undertook the manufacture of armor.

Exhibit No. 2 is a preliminary estimate for an armor plant at Guerigny, in France. This estimate was made by the French Government for the purpose of ascertaining what it would cost to put up an armor plant at that point in connection with the Government works already there, and which are now equipped for the manufacture of chains, cables, steel protective deck plates, etc. No steel, however, is made there. The Government at present buys this material.

A reference to the explanation by Lieut. Commander Rodgers, attached to that exhibit, shows what Mr. Rodgers, after an examination of the present works at Guerigny, supposes the estimate of the French Government to include. It includes, it is supposed, installing the machinery and the erection of additional buildings so far as needed. This estimate, made by the Government of France for the erection in connection with its plant now making protective decks and equipment supplies, is \$700,000 all told.

At present the duty on machinery of this class is 35 per cent. It is much to be regretted that the details of this estimate are not given, but it is to be remembered that this \$700,000 is an official estimate for the Government, and the Government is presumed to have had in view an efficient armor plant. If we allow for duties, which would be collected only on the machinery included in this estimate, and then for higher-priced labor in building houses and installing plant, this could not be more than double this estimate, making it \$1,400,000.

The English estimate, we have seen, as amended by Capt. Sampson, amounts to \$1,590,000, which would pay duties and freight and erect here a plant equal to those in question. Doubling the estimate of the French Government, we have \$1,400,000 for a similar plant, houses, machinery, and all. The average of the two estimates is \$1,500,000. Adding another million for fall in price since they were erected would allow \$2,500,000 for the Carnegie plant, and still another million would give \$3,500,000 for the Bethlehem plant. I shall not, however, insist upon these figures in the calculations to be submitted, but will present tables in which the basis shall be the cost of the plants as given in the letters of the two companies, as, after all, I prefer to rely on these figures. I do not mean even to cast a doubt upon them. I take it that they came from the books of the companies. I have submitted and commented on proofs as to the cost of erecting a plant, as showing that one could now be erected for about \$1,500,000, and these figures will serve as a guide for Congress in deciding whether to erect a plant, and also as a basis in calculating on future contracts.

If a correct conclusion as to cost of plant, which is far the most difficult problem in this investigation, has been reached, we may advance with more confidence to a consideration of other factors in attaining results.

PRICES OF ARMOR ABROAD.

Appended hereto is a diagram of prices marked "Exhibit No. 7," which may be relied upon as showing accurately the prices of armor in the United States, England, France, Germany, and Austria, for armor manufactured at home, and also the prices at which the United States, English, German, and French manufacturers have furnished armor for foreign Governments. These prices have ranged from \$249 to \$650 per ton, the cheapest first-class armor in the list having been furnished to the Russian Government by the Bethlehem Co., and the highest in price, excepting some made in Italy, the armor furnished by the Bethlehem and Carnegie Cos. to the United States under their contracts of 1887, 1890, and 1893. The contracts made by these companies in 1896 were for about \$560 per ton, on an average. Italian prices average nearly \$600. Austrian armor was not first class.

It must be understood that armor plates differ in prices. Difficult shapes cost more, simple shapes less. The figures used throughout this report refer to average prices.

During the debate in the Senate upon the armor question at the last session of Congress, one question discussed was whether there was an understanding or agreement among armor manufacturers throughout the world to keep up prices. This was one of the questions I inquired about upon my recent trip to England and France. If there be any such understanding it is of course impossible to prove it, unless some one of those to whom the secret has been confided should betray his trust. My impression is that there is and has been for some time at least a friendly understanding among armor contractors both in Europe and America as to the prices to be charged for armor. This impression I find prevails abroad, certainly among some of the persons who have inquired into the subject.

Without undertaking in any manner to justify such combinations, there are reasons that would naturally induce armor contractors to agree among themselves as to the prices to be charged to their own Government, and also with armor makers abroad as to the prices at which armor is to be furnished to countries which do not manufacture it.

The manufacture of armor is a special business, dependent upon many uncertainties. The necessary plant is very expensive, armor is the product in large part of machinery, and labor and material are but small items when compared with the original cost of plant and the expense of maintaining it. A manufacturer in possession of a plant which has been paid for by profits can produce armor at rates that would be ruinous to a company in the outset of its operations. A large margin of profit is necessary also to meet the conditions arising out of the uncertainty of orders, the maintenance of a plant when not in operation, and the keeping together of the necessary operatives while awaiting orders. Sharp competition for custom would be apt to cause manufacturers to lose sight of these conditions, and financial disaster would inevitably result from failure to keep them in mind. These natural promptings to such a combination are mentioned only as persuasive to show, when taken in connection with what follows, that a world-wide combination or understanding does exist.

An inspection of the prices paid, as shown by the diagram before referred to, will indicate what is not denied, that the Carnegie and Bethlehem Cos. agreed with each other as to prices. They have divided the contracts of this Government between themselves, each bidding lower than the other for one-half of the armor required at any time by the Government.

In France the Schneider Co., at Creusot, seemed to have had the field largely to itself, and furnished most of the armor to that Government from 1885 till about 1888, when the Chatillon Co. began operations. Afterwards the St. Chamond & Marrel Co. came in, and still later the St. Etienne. These companies, when they began to share in the contracts for armor for the French Government, all charged about the same prices, these prices gradually rising, until 1891, when changes were made in the requirements. In 1892 the United States had adopted the Harvey process of face hardening. France adopted this process in 1893, and we then find that in 1894 all the French companies had raised their prices from about \$370 to about \$470 per ton. Afterwards, in 1896, all these French companies were found charging their Government about \$535 per ton.

In 1895 Russia was in the market for harveyed nickel armor. The Bethlehem and Carnegie Cos., in the United States, were then both well established, and neither had sufficient orders from this Government to employ its plant continuously. There was sharp competition for the order from Russia, and the Bethlehem Co. secured the contract for manufacturing armor for one ship at the very low price of \$249 per ton, this armor to be both nicked and harveyed and to be delivered in Russia, the company agreeing at the same time to manufacture the armor for two other ships, if required, at the same price. The Russian Government afterwards did require for the other two ships, and taken altogether the armor for the three amounted to about 1,400 tons.

The French Government had, in the meantime, in 1894, and prior to these Bethlehem contracts with Russia, been paying to its companies about \$560 per ton for harveyed nickel armor. Early in 1895 the Bethlehem Co. secured another contract from the Russian Government, this time at the price of about \$520 a ton, and almost contemporaneously the Carnegie Co. made a contract with the Russian Government to supply armor at practically the same price as the Bethlehem Co.

Here, then, we have the pregnant facts that the two companies in the United States have had a perfect understanding with each other as to what they should charge their own Government; that the five companies in France seem to have had a like understanding with each other as to what they should charge their Government; that the price of armor in France rose gradually from 1891 to 1894, as improvements were adopted, to about the same price as that which was charged by the Bethlehem and Carnegie Cos. to Russia in 1895, after the former company had forced its way into the European market. I am informed upon authority which I believe to be good that about, or perhaps before, the time of the last contract of the Bethlehem Co. with Russia there was a meeting in Paris of the representatives of the principal, if not all, armor manufacturers of Europe and America.

The diagram shows also that, in 1896, Krupp manufactured for Russia some armor for about the same price as that charged to Russia by the Carnegie and Bethlehem Cos. Dillinger, in 1896, also manufactured armor for Russia at prices about \$30 per ton more than had been charged to the same Government by Krupp and by the Bethlehem and Carnegie Cos. I have been unable to procure the prices at which the English manufacturers furnished armor for other governments. The price, however, at which the Cammel or John Brown Co. and Vickers manufactured harveyed steel armor for their Government was about \$330 per ton. None of this was nickeled and some was not harveyed. It will also be observed that the different companies habitually charged a little more to their own than to other governments. Vicker's armor furnished to the English Government was harveyed but not nickeled.

These facts seem to lead to the conclusion that there is at least a friendly understanding or agreement among the principal armor manufacturers of the world that prices shall be maintained at or about a certain level.

The prices at which the Bethlehem and Carnegie Cos. are now furnishing armor to this Government are \$59 less than those paid under the contract of February, 1893. When about letting out the contracts for the *Kearsarge* and *Kentucky*, I insisted upon lower prices, and after considerable negotiation these two companies were induced to reduce their prices to that extent, and as the price of nickel had fallen in the meantime about \$10 per ton, the rates now being paid for the armor of the *Kearsarge* and *Kentucky* are some \$70 lower than were previously paid.

In June, 1896, a board of officers, consisting of Lieuts. Karl Rohrer, Kossuth Niles, and A. A. Ackerman, was assembled with instructions to make a careful estimate of the actual cost in labor and material for the manufacture of armor now being provided for our battleships. The board submitted a report on July 3, 1896.

Lieut. Rohrer had been inspector at the works of the Bethlehem Iron Co. for the period of three years from August 1, 1892, to March 26, 1895. Lieut. Niles had also been inspector of ordnance at these works from October 18, 1888, to August 31, 1892. The latter was with the Bethlehem Iron Co. as Government inspector from the inception of the manufacture of armor plate, and was consequently familiar with the installation of the plant used in the manufacture of this armor and with all the experiments, failures, etc., which the company encountered in establishing this plant. The connection of Lieut. Rohrer with this company followed in point of time that of Lieut. Niles, so that their combined experiences covered the whole period from October 18, 1888, to March 26, 1895, the date of Lieut. Commander Rodgers's appointment as inspector of ordnance at these works. Lieut. Ackerman had been connected with the manufacture and use of steel in its various forms, principally castings and forgings, at different times, for six years prior to his appointment upon this board. Mr. Ackerman had also spent several months at both the Bethlehem and Carnegie works, and was familiar with the methods employed at both establishments and with the differences in their methods of work.

These gentlemen having thus familiarized themselves with all the processes employed, and being entirely disinterested, the results of their deliberations may be considered as representing with much accuracy the cost of manufacturing armor such as is now used on our battleships. Besides the knowledge thus derived from their experience, these officers had at their disposal the market prices of all materials which go toward the composition of this armor. They were furnished, in addition, through the inspectors of ordnance, and from the records they had made while at these two establishments, with the quantity of material used and the labor required in each of the operations involved in the manufacture of armor. In making their estimate, they began with the cost of the several ingredients charged into the furnace for casting the

ingot preparatory to the forging process. Each item of loss resulting in the casting of the ingot was carefully considered and accounted for. Each item of expense due to mixing, melting, pouring, etc., was considered as constituting a part of the operation and of the cost of casting the ingot. The cost of making the molds, handling the ingot, stripping it, and the material required for preparing it for forging, together with the coal, etc., required in all subsequent heatings and treatment; the cost of power each time the ingot or armor plate was moved, etc., etc., formed a part of the cost of the finished plate. In like manner every other item of cost, including administration, was calculated and added. The result of these calculations was that the cost of the labor and material in a ton of single forged harveyed nickel steel—the Government supplying the nickel—was \$167.30.

All the armor used in our battleships up to the present time is of single forged harveyed nickel steel, except a portion of the *Iowa's* armor, which is double forged. In addition to the items of labor and material, it was found that a considerable allowance must be made for the loss to the manufacturers in material which was rejected for defects occurring at different stages of the process. These losses were at times very large, larger, of course, before the methods of manufacture were thoroughly established, and it is therefore thought just to add 10 per cent to the cost of labor and material to cover these losses. The addition of this 10 per cent increased the estimate for labor and material in a ton to \$184. According to the estimates of Lieut. Commander Rodgers, based upon observations in the manufacture of reformed armor, reforming results in an increased cost to the manufacturer of \$11.27 per ton, which makes the cost of reformed armor (labor and material), \$196.45 per ton.

When the Senate Committee on Naval Affairs, in 1896, commenced the investigation regarding prices of armor, the inspectors at the works of the Bethlehem Iron Co. and of the Carnegie Steel Co. were instructed to investigate and follow carefully each process in its manufacture, the time required and its cost, the kind, quantity and cost of different materials used, in order that they might be prepared with an estimate of the total cost of its production. The estimate thus made by Lieut. Commander Rodgers now and then the inspector at Bethlehem, though formed independently and with slight variations in the methods followed, was for single forged harveyed nickel steel armor, \$178.59; with the 10 per cent added for losses due to rejection, \$196.45; for double forged nickel steel harveyed armor, including the 10 per cent, \$208.85.

The estimate made by the inspector of ordnance at the Carnegie Steel Co., Ensign C. B. McVay, who had been inspector of ordnance at these works during the past year, also based upon careful observation over the whole of this period and upon methods similar to those followed by the board, though varying in details, is for single forged harveyed nickel-steel armor, \$161.54; or, adding 10 per cent for the loss due to rejections, \$177.69; or, for reformed armor, with the 10 per cent added, \$190.09. The department is inclined to give the greater weight to the estimated cost formed by the board, and it is believed to be just to both manufacturers and to the Government to take average of the estimates to be \$185.38 for single forged and \$197.78 for reformed armor.

Considering that the three estimates vary so little, and that they were made independently, the results must be quite near the actual cost. It should be noted in this connection that the first estimates submitted by Ensign McVay for reformed armor, in August, 1896, was, deducting the value of nickel, which is furnished by the Government, \$177.50; adding 10 per cent for the loss due to rejections, \$195.28, which makes his estimate very nearly the same as the two made by Lieut. Commander Rodgers and by the board. Mr. McVay, after following for some months past the production of the reformed armor for the battleships *Kearsarge* and *Kentucky*, has modified his estimate as above indicated, the difference in his two estimates being no doubt partly due to the increased skill of operatives and to improved processes. As, however, these deductions resulted from accurate knowledge of particular processes followed carefully throughout, we must also conclude that Mr. McVay's former statement was very liberal to the contractors.

The items constituting the heads under which the calculations of the Rohrer Board were made are summarized as follows:

| | |
|---|----------|
| Materials in ingot..... | \$30. 13 |
| Materials consumed in manufacture..... | 56. 75 |
| Labor..... | 43. 50 |
| Keeping plant ready for use..... | 9. 80 |
| Shop expenses..... | 2. 38 |
| Office expenses and contingencies..... | 3. 34 |
| Administration, superintendence, and engineering..... | 21. 40 |
| Total..... | 167. 30 |

The methods pursued by the inspectors of ordnance followed, in the main, lines similar to those pursued by the board, as in Exhibit No. 4, though differing occasionally in details of computation. For the purpose of comparison, the report of the board was modified to show also the cost of reformed armor. The report of Lieut. Commander Rodgers was revised so as to include the item of cost of labor and material in maintaining the plant ready for use. The cost of nickel, which is supplied by the Government, was deducted from his given value of the charge. The report of Mr. McVay was changed so as to include the items cost of labor and material in maintaining plant ready for use, office expenses and contingencies, and shop expenses. It is noted that the report of Mr. McVay credits a cost of \$15 per ton to the armor maker for the value of nickel scrap included in the charge, but the cost of forging is correspondingly low, that is to say, the cost of cutting up the scrap, which gives it its real value, is not included.

One of the inspectors estimates the losses from spoiled plates, rejections, etc., at 15 per cent, one at 10 per cent, while the board, composed of three, puts it at 6 per cent, though this latter does not include the cost of experiment, which, however, is estimated to be less than 1 per cent. If the average of the five calculations be taken, this percentage would be $9\frac{1}{5}$, but I have allowed 10 per cent for losses.

Upon my return from Europe, in October, I sent an officer to Harrisburg, Pa., in search of information, and he procured copies of the returns which had been made under an act passed by the Legislature of Pennsylvania in 1889, by the Carnegie and Bethlehem Cos. This act requires annual statements of the capital invested, dividends made, gross and net profits, and accumulations of surplus. The returns made by the Carnegie Co. were so incomplete as to be of very little value. Those made by the Bethlehem Co. are more definite. As procured from the auditor general they contain the returns from this company of capital authorized, capital paid in, and dividends for each year from 1889 to November 1, 1895, inclusive. The returns, however, give gross receipts and net receipts only for the years 1893, 1894, and 1895, including the surplus for the fiscal year ending November 1, 1895. This information, supplemented as it was by that which the department had at hand, constituting the amounts paid for armor during the several years, was important, and I felt that as these returns were not made with a view of being used in an investigation of this character, justice to the company required that it should be notified of the fact that I was considering them, which would suggest the propriety of making any explanations it might deem advisable. (See Exhibit No. 11.) In response to a reply I wired as follows:

DECEMBER 10, 1896.

Answering yours of yesterday, returns give your net earnings and gross earnings for the years 1893, 1894, and 1895, and surplus at end of fiscal year 1895. Would like similar returns for fiscal year ending in 1896, and also surplus at beginning of year 1889, and gross and net earnings for years 1889, 1890, 1891, and 1892.

Two days afterwards a reply was received, giving the information requested. Thereupon I wrote the following letter:

NAVY DEPARTMENT,
Washington, December 12, 1896.

SIR: I am very glad to receive your letter of yesterday containing returns asked for, the gross earnings, net earnings, and surplus of your company at the ends of the fiscal years 1889, 1890, 1891, 1892, and 1896, severally. This information will very much aid me in the conclusions I must reach in the endeavor to arrive at the profits of your company from armor. I would like, however, especially to have also a statement as to what the surplus at the ends of the several years from 1889 to 1896 consisted of. This information would greatly aid me in arriving at correct results. If you can furnish it you will put me under additional obligations. I ought, however, to state further what I have so often stated to your company in different forms, and what I hope you are convinced of, that my earnest desire in this matter is to do absolute justice to your company, as well as to the Carnegie Co., and therefore, any additional information that you could furnish me, other than that herein indicated, to enable me to reach a correct conclusion would be very welcome, and if I can have assurances that you will furnish other information I will gladly delay my report for a few days to enable you to send it.

It might not be amiss for me to say further that I recognize the fact, made clear from my investigation, that the armor plant of the Bethlehem Co. cost more than that of the Carnegie Co. You began first, and you made some costly experiments, especially that with the hammer. The Carnegie Co. had the advantage of your experience and avoided the mistakes which you had naturally committed. The Government ought not, in its legislation, to determine upon any prices that would do an injustice to you

The fact ought to be fully recognized that both the Bethlehem and Carnegie Cos. took up this business of manufacturing armor at the instance of the Government. Both companies are, therefore, entitled to fair remuneration and no prices ought to be determined upon which would do injustice to either. I have only referred to this latter matter for the purpose of furnishing you a further indication, if any were needed, of the manner in which I am conducting this investigation, and of my wish to be just and fair both to the Government and contractors in the conclusions at which I shall arrive in the report to be submitted by me.

If you are still of opinion, after considering this matter, that you ought not to go any further in the direction of furnishing specific information that would enable me to separate the profits made from armor from the profits resulting otherwise, I nevertheless hope that you will see proper to give me at once the statement showing what the surplus consisted of at the ends of the several years.

Very respectfully,

H. A. HERBERT.

ROBT. H. SAYRE, Esq.,
Vice President Bethlehem Iron Co., South Bethlehem, Pa.

An answer to that letter was received as follows:

[The Bethlehem Iron Co., Robert H. Sayre, vice president and general manager.]

SOUTH BETHLEHEM, PA., *December 16, 1896.*

Hon. H. A. HERBERT,
Secretary of the Navy, Washington, D. C.

DEAR SIR: Your favor of the 13th instant is at hand. President Linderman's absence in New York this week up to date, and my absence in Philadelphia on Monday and Tuesday, will account for delay in reply to your letter.

In reply to your inquiry, "as to what the surplus at the ends of the several years from 1889 to 1896 consisted of," I can only say, in the absence of the president, in a general way, the surplus in each of these years consisted of cash, securities, stock on hand, raw material, work in hand and finished, work not accepted or delivered, plant and machinery, etc.—in other words, the surplus is the excess of assets over liabilities, and of course embraces all branches of our business.

We fully appreciate your "earnest desire to do absolute justice to our company in this matter," and have to thank you for the many evidences we have had of this, but you must pardon the natural and proper objections we have, from a manufacturer's standpoint, of giving to the public the details of our business.

Yours, respectfully,

ROBERT H. SAYRE,
Vice President and General Manager.

This letter, it will be perceived, gives no definite information. One especial purpose of my inquiry was to ascertain the component elements of the surplus as it appears in the returns from year to year.

When the table which follows is looked at it will be seen that it would be instructive to know exactly what is meant by the large surplus which was constantly increasing from year to year, but the company not only fails to give any definite statement as to this but it also declines my request for "additional information" about the returns "to enable me to reach a correct conclusion."

The table is made up of the returns from 1889 to 1895, as gotten from the auditor general, to which are added such returns from the company as came in response to my telegram on December 10, recited in my letter of December 12, and then adding the information as to the years 1885, 1886, 1887, and 1888 gathered from the Red Book of Pennsylvania, and payments for armor and gun steel as taken from the books of the Navy and War Departments.

Here is the table thus made up, the basic figures being the company's, and careful attention is invited to it:

Synopsis of reports of the Bethlehem Iron Co. to the auditor general of Pennsylvania, from 1889 to 1896, inclusive, supplemented by statements in letter from the company to the department, under date of December, 1896, and with payments made to the company by the Government, as shown by department records.

| | 1889 | 1890 | 1891 | 1892 | 1893 | 1894 | 1895 | 1896 | 1897 |
|--|--|----------------|----------------|----------------|--|-----------------|-----------------|----------------|------|
| Authorized capital stock..... | \$3,000,000.00 | \$3,000,000.00 | \$5,000,000.00 | \$5,000,000.00 | \$5,000,000.00 | \$10,000,000.00 | \$10,000,000.00 | | |
| Authorized number of shares..... | 60,000 | 60,000 | 100,000 | 100,000 | 100,000 | 200,000 | 200,000 | | |
| Number of shares issued..... | ¹ 52,264 | 56,901 | 80,000 | 80,000 | 80,000 | 100,000 | 100,000 | | |
| Par value of share..... | \$50.00 | \$50.00 | \$50.00 | \$50.00 | \$50.00 | \$50.00 | \$50.00 | | |
| Amount paid in per share..... | \$50.00 | \$50.00 | \$50.00 | \$50.00 | \$50.00 | \$50.00 | \$50.00 | | |
| Amount capital paid in..... | ² \$2,613,200.00 | \$2,845,050.00 | \$4,000,000.00 | \$4,000,000.00 | \$4,000,000.00 | \$5,000,000.00 | \$5,000,000.00 | | |
| Amount on which dividends declared..... | (³) | \$2,729,125.00 | \$3,988,075.00 | \$4,000,000.00 | \$4,000,000.00 | \$5,000,000.00 | \$5,000,000.00 | \$5,000,000.00 | |
| Percentage of dividends..... | ⁸ | ⁹ | ¹⁰ | ¹⁰ | { Cash, 10 Stock, 25 } | ¹² | ¹² | | |
| Amount of dividends..... | \$182,606.00 | \$240,780.50 | \$398,807.50 | \$400,000.00 | { ⁵ \$400,000.00 ⁶ \$1,000,000.00 } | \$600,000.00 | \$600,000.00 | \$600,000.00 | |
| Gross earnings..... | \$4,173,937.42 | \$6,334,743.85 | \$5,622,233.98 | \$6,731,288.83 | \$6,476,333.81 | \$5,359,753.39 | \$5,358,016.97 | \$5,826,233.87 | |
| Net earnings..... | \$9,996.69 | \$490,846.93 | \$657,402.86 | \$787,187.11 | \$1,293,729.89 | \$1,561,402.42 | \$1,109,276.53 | \$859,711.52 | |
| Surplus, or profit and loss account..... | { ⁷ \$1,976,614.66 ⁸ \$1,956,660.02 } | \$2,077,839.43 | \$2,420,675.33 | \$2,927,862.44 | \$3,821,592.33 | \$3,882,994.75 | \$4,392,271.28 | \$4,651,982.80 | |

PAYMENTS BY THE GOVERNMENT TO THE BETHLEHEM IRON CO.

| | | | | | | | | | |
|------------|-------------|--------------|-------------|--------------|----------------|----------------|----------------|----------------|-----------------------------|
| Armor..... | | | \$42,795.68 | \$322,334.33 | \$1,963,545.36 | \$1,610,996.53 | \$1,334,247.82 | \$1,089,884.76 | ⁹ \$1,800,000.00 |
| Gun steel: | | | | | | | | | |
| Navy..... | \$51,456.13 | \$179,690.95 | 602,817.06 | 597,187.38 | 588,699.51 | 511,883.03 | 130,079.36 | 244,927.89 | ⁹ 500,000.00 |
| Army..... | | 53,967.88 | 287,095.13 | 415,734.56 | 930,422.54 | 699,589.78 | 544,368.45 | 96,012.52 | ⁹ 1,000,000.00 |
| Total..... | 51,456.13 | 233,658.83 | 932,707.87 | 1,335,256.27 | 3,482,667.41 | 2,822,479.34 | 2,008,695.63 | 1,430,825.17 | ⁹ 3,300,000.00 |

¹ Prior to April, 1889, 40,000.

² Prior to April, 1889, \$2,000,000.

³ April, 1889, \$2,000,000; November, 1889, \$2,565,150; average, \$2,282,575.

⁴ Letter.

⁵ Cash.

⁶ Stock.

⁷ Beginning.

⁸ Ending.

⁹ Estimated.

GRAND TOTALS.

| | |
|------------|----------------|
| Armor..... | \$8,163,804.48 |
| Gun steel: | |
| Navy..... | \$3,406,751.31 |
| Army..... | 4,027,190.86 |
| Total..... | 7,433,942.17 |
| Total..... | 15,597,746.65 |

These figures show that especially during the period from 1890 to 1896, inclusive, the company was doing an extraordinarily prosperous business. It seems also to have done a fairly prosperous business in 1885, 1886, 1887, and 1888. During two of these years it declared 12 per cent dividends and during the other two 10 per cent. Its capital was then \$2,000,000, engaged in the manufacture of steel rails and steel in other forms.

After it undertook Government business and began to receive returns from its armor and gun plants it made no separate returns of the profits derived from its work done for the Government and for the public, but by deducting receipts for Government work from total gross receipts in each year we find what was the volume of the company's commercial business.

A careful inspection of the figures, however, shows that whenever the Government business was largest the net earnings were greatest, notwithstanding the fact of a decrease during those years in the total volume of business. The year 1893 seems to have been an exception to this rule. This is probably to be accounted for by the fact that it was during that year that the company paid for the last important improvements in its plant, which is taken to have been done out of its earnings before the net amount was declared. The table shows many other indications that the net earnings were the sums left after deducting from the gross earnings whatever was paid toward plant, e. g., in 1889, when much of the plant was erected, the net earnings were less than \$10,000; gross earnings over \$600,000. However that may be, these returns, taken all together, clearly indicate that all the plant has been paid for, whatever it may have cost, as I shall endeavor to demonstrate. Still there remain no means apparent on the face of these returns for determining how much of the net earnings came from Government business.

I have supposed that the proper method of arriving at the profit of this company from its Government contracts would be to make a very liberal estimate on the possible earnings of its commercial plant and deduct this from the aggregate net earnings of the entire business. It will certainly be liberal to consider that its commercial plant has paid during the years from 1889 to 1896, inclusive, a dividend of 10 per cent, about what it was paying before. Its average during the four previous years was 11 per cent, but those years were far more prosperous than has been the period elapsing since that time.

An inspection of the Red Book of Pennsylvania shows that during the period from 1885 to 1888, inclusive, many companies were declaring dividends regularly which have since failed for years to declare any whatever, and that none of the principal companies engaged in business like that of the Bethlehem Co. have averaged as large dividends since 1889 as they did from 1885 to 1889.

Below is an abstract showing the dividends made by different steel companies in the State of Pennsylvania, where these two armor plants are both located, from the years 1885 to 1894, inclusive. These are only the largest and, presumably, most prosperous companies; and they are selected because they have been doing work similar to that in which the Carnegie Co. is now engaged and in which the Bethlehem Co. was exclusively engaged up to the time it made its contract with the Government for armor and gun steel in 1887.

The dividends of the Bethlehem Co. after 1889 are omitted from this abstract. They were declared on all business—we are seeking to separate Government from commercial business—and the figures are given to show what others were earning on commercial manufactures.

Statement of dividends paid by iron and steel companies doing business in Pennsylvania with a capital of \$500,000 or over, as given in the Red Book of Pennsylvania Securities for 1894-95.

| Name of company. | Dividends. | | | | | | | | | |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|------------|------------|------------|-------|-------|
| | 1885 | 1886 | 1887 | 1888 | 1889 | 1890 | 1891 | 1892 | 1893 | 1894 |
| Bethlehem Iron Co..... | <i>Pr. ct.</i> 10 | <i>Pr. ct.</i> 12 | <i>Pr. ct.</i> 12 | <i>Pr. ct.</i> 10 | <i>Pr. ct.</i> 18 | ..... | ..... | ..... | ..... | ..... |
| Cambria Iron Co..... | ..... | 15 | 12 | 10 | 10 | 10 | 10 | 10 | 8 | ..... |
| Pennsylvania Steel Co..... | { 24 38 | { 24 38 | { 24 32 | { 27 35 | { 26 36 | { 29 33 | { 26 36 | { 26 36 | ..... | ..... |
| Wm. Wharton, jr., & Co..... | ..... | ..... | ..... | ..... | ..... | 6 | 7½ | 6 | 7 | ..... |
| Catasauqua Manufacturing Co..... | 4 | 4 | 6 | 3 | 3 | 7 | 3 | 3 | ..... | ..... |
| Lukens Iron & Steel Co..... | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| North Branch Steel Co..... | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) | (4) |

¹ The November dividend of this year being 4 per cent in cash, with option to take stock at \$80 per share.

² Cash.

³ Stock.

⁴ Dividends from 6 per cent to 8 per cent made annually and carried to surplus.

From this abstract it appears that the Bethlehem Co. in 1885, 1886, 1887, and 1888 made four annual dividends, two of which were at 10 per cent and two at 12 per cent. The most prosperous company not having Government work is the Cambria Steel Co. This company declared larger dividends than did the Bethlehem Co. up to 1888, when the latter had undertaken Government work. No other company appears to have been as prosperous or to have declared as large dividends since 1889 as the Cambria Co. The Cambria Co. from 1889 forward did not average 10 per cent per annum. It is therefore fair to presume that if the Bethlehem Co. had continued to do only a commercial business it would not have made more than 10 per cent from 1889 down to the present time. To allow it, during this period of widespread depression, 10 per cent on its commercial business is to treat it liberally.

The testimony of Lieut. Niles, hereto attached and marked "Exhibit No. 8," shows that during a considerable portion of the period for which it is proposed to allow the 10 per cent on its commercial business this company's rail mills were idle.

In the calculations following this the company is considered as having made a profit of 10 per cent on all its commercial business since it undertook Government work. It will be noted that I base no estimates on the large dividends declared not only on the \$4,000,000 paid for stock, but on the \$1,000,000 dividend stock or on the constantly increasing annual surplus. This can not be done for want of knowledge as to meaning of surplus. The reasoning is based entirely on net receipts.

The synopsis of the Bethlehem Co.'s reports shows that its paid-up capital at the time it undertook this Government work in 1887 was \$2,000,000; that this capital was gradually increased, new stock being issued in 1889, 1890, and 1891, amounting altogether to \$2,000,000. In one of these years it appears that an option was given to stockholders to receive their dividends in money, or in lieu thereof stock at the value of \$80 per share. It is presumed that some stockholders were willing to take and did take stock for their dividends, but even though this may have been done, in the calculations hereinafter made the stockholders are credited with having paid cash in full at par for all the \$2,000,000 of stock.

Now, if the net profits as shown by this synopsis are sufficient, first, to pay back to the stockholders in full the money paid for this \$2,000,000 of new stock; second, to pay interest at 10 per cent on this new stock up to the time it was repaid; third, to pay the Bethlehem Co. 10 per cent per annum on its original \$2,000,000 of stock, which represented its commercial plant; and, fourth, to pay all the indebtedness of the company and leave its surplus unimpaired, then it follows that the profits made upon armor and gun steel by this company have paid for all the new plant and have refunded all the money invested in the business of making armor and gun steel, having first paid fair profits thereon up to the time of refunding such moneys to the investors. The only possible answer to this is that the plant, other than that erected to manufacture armor and gun steel, has really made more than 10 per cent per annum, and this is not conceivable, considering, first, the general depression during this period, and, second, that it is known that a portion of the company's commercial plant has been much of the time idle. The calculations set forth in the following table show that the net profits accomplish these results, besides paying the bonded debt, amounting to \$1,351,000, first shown on the company's report for 1895, and that after all this there is a balance of profit of \$672,728.95 to be distributed among the stockholders.

At the same time the surplus, which January 1, 1889, before the receipts from Government business began to come in in any quantity, was \$1,976,614.66, has increased to \$4,651,982.80. This surplus was presumed to be made up of cash in hand, notes, bills receivable, and stock on hand, manufactured and unmanufactured; but fearing that this assumption might be unjust to the company, although it is a presumption that arises from the face of the accounts, I wrote the letter hereinbefore set forth to the company on the 12th day of December. It will be seen that in the reply, dated December 16, it is admitted that this surplus is made up in part of such items as have been supposed, but it is also stated that it in part consists of plant.

There is also an item of \$880,000 floating debt in the report of 1885, but of this no estimate is made. It is the usual outstanding debt, amply taken care of by a surplus, also not taken into account, of more than five times its volume.

If the account is made up with the company according to its own statements from November 1, 1889, up to November 1, 1896, it will be as follows:

Profit and loss account, based on reports to auditor general, State of Pennsylvania.

| | |
|--|--------------------|
| Net earnings, 1889 to 1896, inclusive..... | \$6,769,553.95 |
| Deductions: | |
| Interest on original capital stock of \$2,000,000 for 8 years, at 10 per cent per annum..... | \$1,600,000.00 |
| Repayment capital added in 1889..... | 613,200.00 |
| Interest on same, at 10 per cent for 7 years..... | 429,240.00 |
| Repayment capital added in 1890..... | 231,850.00 |
| Interest on same, at 10 per cent for 6 years..... | 139,110.00 |
| Repayment capital added in 1891..... | 1,154,950.00 |
| Interest on same, at 10 per cent for 5 years..... | 577,475.00 |
| Repayment bonds shown on report for 1895..... | 1,351,000.00 |
| | <hr/> 6,096,825.00 |

Balance of profit, 1889 to 1896, inclusive..... 672,728.95

This allows dividends annually on \$2,000,000 at the rate of 10 per cent for eight years; it repays the \$2,000,000 paid in, with 10 per cent from the dates when the capital was subscribed; it pays the bonds shown on the report for 1895 and leaves a profit from 1889 to 1896, inclusive, of \$672,728.95 to put to the credit of the gun and armor plants, in addition to the 10 per cent already allowed on new stock.

The Bethlehem Co. is now engaged in executing a contract for one-half of the armor intended for the *Kearsarge* and *Kentucky*. This contract requires it to complete this armor before the 1st of January, 1898. The prices for this armor having been agreed upon, the profit can be estimated. Then, supposing that the company will continue to make, up to the end of the year 1897, 10 per cent upon its original \$2,000,000 of capital, the account will stand as follows:

Profit and loss account.

| | |
|--|--------------------|
| Net earnings, 1889 to 1898 (1897 estimated)..... | \$7,619,553.95 |
| Deductions: | |
| Interest on original stock of \$2,000,000 for 9 years, at 10 per cent per annum..... | \$1,800,000.00 |
| New stock issued, 1889..... | 613,200.00 |
| Interest on same, at 10 per cent, 8 years..... | 490,560.00 |
| New stock issued, 1890..... | 231,850.00 |
| Interest on same, 10 per cent, 7 years..... | 162,295.00 |
| New stock issued, 1891..... | 1,154,950.00 |
| Interest on same, at 10 per cent, 6 years..... | 692,970.00 |
| Proceeds bonds shown on report for 1895..... | 1,351,000.00 |
| | <hr/> 6,496,825.00 |

Balance of profit for period..... 1,122,728.95

It will be observed that in the above estimates the figures furnished by the company itself have saved me the necessity of estimating either the cost of plant or the cost of labor and material in a ton of armor. It will also be noticed that these estimates include all the work done by this company, whether with its commercial or industrial plant, whether armor or gun steel for the Navy or gun steel for the Army, and all other material manufactured with its special plant.

In order to ascertain exactly the profits made by the operation of the company's armor plant and gun plant, I have constructed the following table, still upon the supposition that 10 per cent per annum upon the original stock of \$2,000,000 has been first deducted from the net earnings for the period in question:

| Year ending Dec. 31— | Net earnings, less 10 per cent on \$2,000,000. | Stock issued, assumed to be at beginning of year. | 22 per cent dividend on outstanding stock from issue. | Surplus to reduce stock. | Outstanding stock. | Accumulated surplus to pay bonds. |
|----------------------|--|---|---|--------------------------|--------------------|-----------------------------------|
| 1889..... | -\$190,003 | \$613,200 | | | { \$613,200 | ..... |
| 1890..... | - 290,847 | | | | | |
| | + 100,844 | 1,154,950 | | | 2,000,000 | ..... |
| 1891..... | 457,403 | | | | | |
| 1892..... | 587,187 | | \$1,030,738 | \$114,696 | 1,885,304 | ..... |
| 1893..... | 1,093,730 | | 414,876 | 678,854 | 1,206,450 | ..... |
| 1894..... | 1,361,402 | | 265,419 | 1,095,983 | 110,467 | ..... |
| 1895..... | 909,277 | | 24,299 | 110,467 | | \$774,511 |
| 1896..... | 659,711 | | | | | 659,711 |
| Total..... | 5,169,554 | | 1,735,332 | 2,000,000 | | 1,434,222 |

The above shows that the Bethlehem Co., after paying 22 per cent on all money put into new plant from date of issue of stock and till its cancellation, can repay its stockholders in full and accumulate a surplus of \$1,434,222, sufficient to more than pay off its bonded debt of \$1,351,000.

These two calculations both show net results. Whatever may have been the cost of the armor plant and the gun plant, whatever may have been paid for the secrets of manufacture or for patents, whatever may have been the interest on working capital, all those and other charges were paid from the gross earnings of the company; only net earnings have been considered, and the results show that the company's investments in plant to make armor and gun steel for the Government have been returned with 22 per cent thereon.

If in any respect I have been misled by these figures, the error into which I may have fallen could have been prevented by the Bethlehem Co. It was informed that I was considering them, and when asked for certain additional figures it furnished them, but in response to my invitation to make further explanation it declined. It preferred to stand upon the inferences naturally to be drawn from these figures rather than to make further disclosures.

It is confidently believed, however, that there is no error whatever in the conclusions reached. It should be noted, further, that in attaining the conclusions in first table on page 33 no account was taken of the profits which will accrue on the Government contracts the Bethlehem Co. has for armor and gun steel for the Army and Navy for ensuing years. These amount to over \$3,000,000, on which profits will be very large.

Turning now to the Carnegie Co., it has been necessary in this case, in the absence of such returns as we have from the Bethlehem, to resort to the best evidence attainable for the purpose of showing—

- (1) The value of its plant.
- (2) The price of the labor and material entering into a ton of armor.
- (3) The amount that should be allowed the company for maintenance and the amount of the plant upon which maintenance should be allowed.

Having determined these items, calculations have been made by using figures from the department's books and thus constructing tables hereafter set forth.

As to the cost of the plant, I have taken, in the table most relied on, the figures given by the company itself, to wit, \$3,000,000, although the testimony hereinbefore commented upon is very persuasive to show that this is a large estimate.

The figures given by the company itself will be allowed for maintenance. I have not, however, allowed this 5 per cent upon the whole cost of the plant, but only on \$2,000,000, for reasons hereinbefore set forth, viz, that the land and much other of the plant requires no appreciable charge for maintenance, and that maintenance can not properly be allowed upon what may have been paid for the plant, but that it can only properly be estimated upon the value of the plant; and I have given figures which seem to me conclusive to show that a plant like that of the Carnegie Co. can be erected for about \$500,000 less than the \$2,000,000 allowed as to past transactions. It is estimated in the table below that the cost of labor and material in a ton of nickel-steel armor is \$162.80; in a ton of Harvey nickel steel, \$185.38; and in a ton of double-forged nickel steel \$197.78.

These figures having been arrived at, the question which next presented itself, and which was considered with great care, was as to the proper manner of stating an account. After much consideration I finally decided that it was proper to credit the company with the cost of its plant and keep no interest account whatever, either with the Government or with the company. A manufacturing company needs no interest account, if it has sufficient working capital and is doing a special business, such as the furnishing of armor under contract to a customer who pays promptly upon delivery; and I allow a working capital of \$750,000.

An inspection of the table made out below will be persuasive to show that this sum, if allowed during a period of years, is ample. Money came in regularly in large amounts and always bringing large profits. The supposition has been made that the company has this working capital on hand at the beginning of the period, and it is allowed 5 per cent per annum for the use of it as a fixed charge, the principal remaining on hand at the end of the period. The table gives the number of tons of armor delivered during each period of six months and the price paid therefor. It is supposed that when payments are made to the company during these several periods, the money is deposited in its safe until a dividend is declared. Up to the moment when these dividends are declared, of course this cash is always available as working capital.

After declaring a given dividend at the end of each period of six months, the remaining net profits on hand are supposed to be paid to the stockholders, thus extinguishing their capital. When the profits over and above the assumed fair dividend are paid to the stockholders, the capital stock is pro tanto extinguished and dividends for the ensuing six months are declared upon the reduced amount of capital, again at the same assumed rate, the surplus profits again going to reduce capital stock, and so the capital continues to be reduced at the end of each period of six months whenever there is a surplus of profit on hand for that purpose. The profits are arrived at by deducting from the amount received from the Government the amount of labor and material and 10 per cent for losses and the fixed charges of 5 per cent for maintenance and 5 per cent on \$750,000 working capital.

The period covered by the estimates runs from January 1, 1892, when the Carnegie Co. had begun to deliver armor, to June 30, 1897, when it will have completed its contract for one-half the armor for the *Kearsarge* and *Kentucky*.

The table is based on a valuation of the plant of the Carnegie Co. at \$3,000,000, and 5 per cent allowed on their entire amount for maintenance, etc., as claimed by the company in its letter to the department. Interest at 5 per cent is also allowed on \$750,000 working capital. Price of armor the same as in table that follows it.

Dividends of 10 per cent (5 per cent semiannually) are allowed on outstanding capital, and the entire cost of plant, \$3,000,000, is practically extinguished by remaining surplus upon the completion of existing contracts.

| Period ending— | Ton- nage livered. | Cost, in- cluding 10 per cent for rejec- tions. | Fixed charges, 5 per cent, \$3,000,- 000; 5 per cent, \$750,000. | Total cost, in- cluding fixed charges. | Pay- ments to the com- pany by the Gov- ernment. | Net profits, differ- ence be- tween pay- ments and total cost. | Divi- dends, 10 per cent on out- standing capital. | Net sur- plus ap- plied to reducing capital. | Out- standing capital (plant). |
|--------------------|--------------------------|--|---|--|---|--|--|--|---|
| June 30, 1892..... | 586 | \$95,392 | \$93,750 | \$189,142 | \$160,356 | ..... | ..... | ..... | \$3,000,000 |
| Dec. 31, 1892..... | 329 | 53,511 | 93,750 | 147,261 | 160,384 | ..... | ..... | ..... | 3,000,000 |
| June 30, 1893..... | 1,195 | 198,012 | 93,750 | 291,762 | 650,111 | \$342,686 | ..... | ..... | 3,000,000 |
| Dec. 31, 1893..... | 1,869 | 346,347 | 93,750 | 440,087 | 929,508 | 489,421 | \$600,000 | \$232,107 | 2,767,893 |
| June 30, 1894..... | 1,003 | 185,837 | 93,750 | 279,587 | 709,667 | 430,080 | 138,395 | 291,685 | 2,476,208 |
| Dec. 31, 1894..... | 1,473 | 272,921 | 93,750 | 366,671 | 925,486 | 558,815 | 123,810 | 435,005 | 2,041,203 |
| June 30, 1895..... | 1,367 | 253,277 | 93,750 | 347,027 | 784,430 | 437,403 | 102,060 | 335,343 | 1,705,860 |
| Dec. 31, 1895..... | 792 | 156,567 | 93,750 | 250,317 | 510,785 | 260,468 | 85,293 | 175,175 | 1,530,685 |
| June 30, 1896..... | 829 | 163,830 | 93,750 | 257,580 | 544,918 | 587,338 | 76,534 | 510,804 | 1,019,881 |
| Dec. 31, 1896..... | 1,153 | 227,919 | 93,750 | 321,669 | 601,721 | 280,052 | 50,994 | 229,058 | 790,823 |
| June 30, 1897..... | 2,054 | 406,480 | 93,750 | 500,230 | 1,248,607 | 748,377 | 39,541 | 708,836 | 81,987 |
| Total..... | 12,650 | 2,360,083 | 1,031,250 | 3,391,333 | 7,225,973 | 4,134,640 | 1,216,627 | 2,918,013 | ..... |

¹ Includes \$300,000 profit on contract with the Russian Government for 1,000 tons armor, at \$529 per ton, the cost of which is assumed as \$221 per ton, labor and material, less nickel, \$197.78 (\$179.80+10 per cent for rejections, etc.), the same as for this Government, leaving a balance of \$23.22 to cover cost of nickel, freight, insurance, etc., to Russia. Nothing is allowed on this contract for maintenance, interest on working capital, etc., as the whole amount of "Fixed charges" is included in the cost of armor produced for the United States during the same period.

It will be seen here that but \$81,000 capital remains after paying maintenance upon and extinguishing \$500,000 more than the company says its books show the plant cost. The addition for land, etc., is practically wiped out.

Assume cost of plant as \$2,500,000 and working capital as \$750,000.

Assume cost of armor per ton (labor and material) as \$148 for 1,950 tons nickel steel; \$168.53 for 5,872 tons harveyized steel; \$179.80 for 4,828 tons reformed steel (these prices being the average of the estimates submitted), adding 10 per cent for losses by rejections, etc.

Assume \$2,000,000 as the value of perishable plant and allow 10 per cent thereon for depreciation, or maintenance, insurance, taxes, etc., and 5 per cent interest on working capital as annual fixed charges. Then allow 10½ per cent dividends (5¼ per cent semiannually) on outstanding capital (plant), applying the surplus of net earnings after deducting dividends for each period of six months to the extinguishment of cost of plant.

The following table shows the result:

| Period ending— | Ton- nage de- livered. | Cost, in- cluding 10 per cent for rejec- tions. | Fixed charges, 10 per cent, \$2,000,- 000; 5 per cent, \$750,000. | Total cost, in- cluding fixed charges. | Pay- ments to the com- pany by the Gov- ernment. | Net profits, differ- ence be- tween pay- ments and total cost. | Divi- dends, 10 per cent on out- standing capital. | Net sur- plus ap- plied to reducing capital. | Capital out- standing (plant). |
|--------------------|---------------------------------|--|--|--|---|--|--|--|---|
| June 30, 1892..... | 586 | \$95,392 | \$118,750 | \$214,142 | \$160,356 | ..... | ..... | ..... | \$2,500,000 |
| Dec. 31, 1892..... | 329 | 53,511 | 118,750 | 172,261 | 160,384 | ..... | ..... | ..... | 2,500,000 |
| June 30, 1893..... | 1,195 | 198,012 | 118,750 | 316,762 | 650,111 | \$267,686 | ..... | ..... | 2,500,000 |
| Dec. 31, 1893..... | 1,869 | 346,337 | 118,750 | 465,087 | 929,508 | 464,421 | \$525,000 | \$207,107 | 2,292,893 |
| June 30, 1894..... | 1,003 | 185,837 | 118,750 | 304,587 | 709,667 | 405,080 | 120,377 | 284,703 | 2,008,190 |
| Dec. 31, 1894..... | 1,473 | 272,921 | 118,750 | 391,671 | 925,486 | 533,815 | 105,430 | 430,385 | 1,577,805 |
| June 30, 1895..... | 1,367 | 253,277 | 118,750 | 372,027 | 784,430 | 412,403 | 82,835 | 329,568 | 1,248,237 |
| Dec. 31, 1895..... | 792 | 156,567 | 118,750 | 275,317 | 510,785 | 235,468 | 65,532 | 169,936 | 1,078,300 |
| June 30, 1896..... | 829 | 163,830 | 118,750 | 282,580 | 544,918 | 262,338 | 56,611 | 205,727 | 872,573 |
| Dec. 31, 1896..... | 1,153 | 227,919 | 118,750 | 346,669 | 601,721 | 255,052 | 45,810 | 209,242 | 663,330 |
| June 30, 1897..... | 2,054 | 406,480 | 118,750 | 525,230 | 1,248,607 | 723,377 | 34,825 | 688,552 | 125,220 |
| Total..... | 12,650 | 2,360,083 | 1,306,250 | 3,666,333 | 7,225,973 | 3,559,640 | 1,036,420 | 2,525,220 | ..... |

¹ Surplus.

If the value of perishable plant be assumed as \$1,500,000, thus reducing the fixed charges to \$93,750 semiannually and correspondingly increasing the net profits by \$25,000 for each six-month period, then the dividend can be increased to 13+ per cent (6½ per cent semiannually) and still extinguish capital with remaining surplus upon the completion of contracts.

If the fixed charges be made 5 per cent instead of 10 per cent on a \$2,000,000 plant, dividends can be increased to 15 per cent and extinguish capital besides.

Comparing now the results arrived at in the cases of the two companies, reached, as they have been, by entirely different methods, a strong presumption arises in favor of the accuracy and justness of the figures determined upon as the cost of manufacturing armor. In the case of the Carnegie Co. there were no figures showing either net proceeds or gross earnings. Recourse must necessarily have been had to estimated costs of manufacture. These estimates show that this company's business done entirely by its armor plant has netted to it 10 per cent profit after the amortization of its plant.

The Bethlehem Co.'s letter claimed plant at \$4,000,000, excluding land, railroad connections, interest during construction, etc. For these another \$500,000 could as well be added, as in the somewhat similar case of the Carnegie Co. Then adding another \$500,000 for gun plant and we should have Bethlehem, \$5,000,000; Carnegie, \$3,000,000. Up to November, 1896, the Bethlehem Co. received of Government money, \$12,297,000. Up to the end of the Carnegie Co.'s account it will have received \$7,225,000. The Bethlehem's own figures show (Table 1) that up to November, 1896, its profits paid for its plant in full, much of it being built on the place, paid 10 per cent on its cash investment and left a surplus of \$672,000. The figures based on officers' estimates of cost show that the Carnegie investment was returned with 10 per cent and no surplus. All things considered, these results strikingly corroborate each other.

Further confirmation of the accuracy of the methods adopted in this investigation is derived from a consideration of the reasonableness of the results attained. The companies, when they began their ventures, counted the costs and took the chances. There was ground for doubts about appropriations—the demand for armor plate might cease at any session of Congress and they could only have been justified by naming figures for manufacturing that would reimburse them in a short period of time, provided legislation were favorable. The Congress has made reasonable appropriations, a reasonable time has elapsed, both companies are found by this report to have received back their investments—that is to say, the Bethlehem Co. got it back with 10 per cent and a surplus November 1, 1896, and the Carnegie Co. will be practically reimbursed its capital with 10 per cent by the 30th of June next.

EQUITABLE PRICE FOR ARMOR.

The statute under which this report is being made requires me to report not only what is the actual cost of manufacturing armor, but also what sum ought equitably be paid for armor to these two companies. This question is quite as difficult as any other

involved in this inquiry. Many things are to be taken into consideration. The Government of the United States, having created these plants, ought to perpetuate them. If we are to continue building a Navy, we must have armor plants. It is not good policy to buy our armor abroad. No single feature connected with the upbuilding of a new Navy is more gratifying than the fact that we have domesticated in our own country all the industries necessary to make us, in matters pertaining to the public defense, completely independent of the world.

This is not in any manner the question of free trade or protection. Every great country in the world, whether it is on a free-trade or a protective basis, takes care that it shall be able to manufacture all the arms and munitions of war necessary for its protection against a public enemy. You must therefore pay for armor in the future a price sufficiently liberal to justify these contractors, or others, in keeping plants in order and ready at all times to manufacture armor if occasion should require. The present size and strength of our Navy is not so efficient a factor in keeping the public peace and in creating respect for our country abroad as is our capacity rapidly to increase that Navy to any required extent.

What, then, will be a price sufficient to justify manufacturers in maintaining armor plants? These two contractors, we have seen, have already been repaid the cost of their plants, together with fair profits thereon. The Government, therefore, is under no obligation to pay them any more upon the cost of their original investment, but it should pay them enough to induce them willingly to maintain these plants, and in fixing upon such a price it must consider the cost of maintaining these plants, the probabilities of their getting work from the Government in the future, the difficulties to be encountered in retaining a force of laborers during intervals between contracts, and the absolute loss resulting from having to keep a plant in order when there is no work for it.

Under all these circumstances it can not be said that such a percentage of profits upon armor contracts as would be readily agreed to if it were certain that orders for work would follow regularly for a number of years would be satisfactory to such contractors. There are now three ships under contract for which armor is to be supplied. These ships will require about 8,400 tons of armor. This, divided between the two contractors, would give to each 4,200 tons. The manufacture of this armor may be begun on the 1st of July next, the time at which these companies will complete their present contracts, and each of the companies can complete and deliver 4,200 tons by the 1st of August, 1898.

FINAL COST.

It has been determined that the cost of the labor and material in a ton of double-forged nickel-steel harveyized armor, including allowances for losses in manufacture, is \$197.78. This comprises every element of cost in its manufacture save and except only the maintenance of plant. If 10 per cent be allowed for maintenance, the value of the plant must be determined upon. And here again arises the difference between the cost of a plant and its value. When we consider the question of repaying investors we must count the price the plant cost; but whether paid for or not a plant must be kept in repair, maintained, and the charge for maintenance is a percentage on its value, not on its cost. It will be remembered that in the table relating to the Carnegie Co. only 5 per cent was allowed for maintenance. This was because the statement of the company only claimed 5 per cent, and it certainly did not so far cost more than that to maintain the plant or more would have been claimed. It is more than probable that 5 per cent is sufficient for an armor plant through any long period. But to err, if at all, on the side of the contractors, I allow in this calculation 10 per cent for maintenance.

The present value of an armor plant like those of the two companies referred to—the price at which such a plant could be erected—is, according to the figures heretofore attained, \$1,500,000; the allowance for maintenance, at 10 per cent, \$150,000 per annum while the plant is in operation. If we suppose that 2,500 tons of armor are manufactured per annum, this will give an average per ton of \$60, which, being added to the cost of labor and material, will make, in round numbers, \$256. If 3,000 tons per annum are manufactured, the price of each ton would be ascertained by adding \$50 to the \$198, or \$248, so that we may take \$250, in round numbers, as the cost of a ton of armor when the companies have fair orders for work.

Now, if we compare this price with the price at which the Bethlehem Co. furnished armor to the Russian Government, we have in our estimate reached almost the exact figure of this Bethlehem bid, which was \$249. This company is said to have stated that it made this low bid to get into the European market with American armor; that it knew it would suffer a loss. The armor was to be delivered in Russia, and

transportation and insurance could not have been less than \$4 per ton. The nickel furnished by the company in this case cost \$20 per ton. Deducting this \$24 from \$249 leaves \$225. If the cost to the company of a ton of armor, including the price of keeping its plant in repair, was \$250 per ton, it thus suffered a loss on its contract of \$25 per ton, which, multiplied by 1,400 tons, makes a total loss of \$35,000.

It is conceivable that the company might have been willing to make armor at such a rate as this, especially as it must at any rate have kept its plant in repair, and considering also how very desirable it was that it should retain its employees. If \$250 per ton was the full cost of manufacture, including maintenance, the company could truthfully say it was making the armor at less than cost, although there were good financial reasons why it should do so. It will be observed that these figures come from entirely different sources. On the one hand, we have a bid, the actual price at which 1,400 tons of armor were manufactured; on the other hand, we have figures entirely independent, none of which were made with any expectation of this coincidence. The amount of armor in the last contract made by this company with Russia, for which it received \$520.70 per ton, was only 1,137 tons. It was not certain that the company, when it made its first contract, would even get another contract as large as this.

The whole transaction certainly shows that the profits this company expected to realize in the European market, into which it was thus forcing its way, must have been large. If there was no loss in the first contract at \$249, then there was an immense profit in its next contract, at \$520.70. If there was a loss on each of 1,400 tons it could not have been very great or the company could not have expected to recoup except by a reasonable rate of profits on large contracts, which it could have little reason to expect in Europe, or by making large profits on the small contracts which only it could reasonably expect to secure.

It is essential, as has already been stated, that these or other armor plants be kept in operation, or at least be maintained in readiness for Government work, and such prices must be paid as will satisfy contractors that they will be remunerated for maintaining plants. It is, of course, uncertain how many battleships the Government is to authorize. The Navy Department has recommended three during the present session, but it is not yet known whether this recommendation will be followed, and no business man would be justified in assuming that any given number of ships would be authorized in a given time. Both the Carnegie and Bethlehem Cos. erected plants which certainly cost millions of dollars, but this was done upon the faith of immediate contracts guaranteeing them very large profits.

If, now, Congress shall decide, as this report will recommend, that no such profits upon the cost of labor and material as have heretofore been earned are to be allowed in the future, it is not probable that other business corporations will venture upon the establishment of plants, although it is shown by the evidence set forth in this report that plants can now be erected for very much less than was paid for those of the Carnegie and Bethlehem Cos.

Should the present armor contractors refuse to make contracts at the figure that may be decided upon by Congress, it is not probable that others would undertake the work. For this reason, and because it is not believed to be desirable that the Government itself should manufacture armor, very liberal profits should be offered to the present contractors to induce them to continue their plants in operation.

It therefore seems to me that under all the circumstances, considering the uncertainty of future contracts and in view of the fact that these contractors have heretofore established plants on the faith of orders they were to receive thereafter from the Government, it would not be inequitable to allow them 50 per cent upon the future cost of manufacturing armor. Fifty per cent added to \$250 would be \$375, but it is to be remembered that the Government has heretofore furnished the nickel and that the item of \$197.78 for labor and material does not cover the cost of the nickel.

It was quite proper that the Government, in the outset of this enterprise, should have furnished the nickel. Nickel had up to that time never been used in the manufacture of armor, as there was for it no such extensive market as has since been created; the price had not then been standardized. The nickel in the first armor cost \$29 per ton. The price has fallen to \$20 per ton. Inspectors now fully understand the nature and quality of this material, and there is no reason why contractors should not furnish it as they do the steel, manganese, etc.

It is therefore suggested that in future contracts manufacturers shall be required to furnish their own nickel. Adding \$20 for this item to \$375, we have \$395 per ton, and allowing something for keeping nickel on hand, we have in round numbers \$400 per ton. This seems to me a fair and equitable price to pay for the armor for the Wisconsin, Alabama, and Illinois.

This appears to be a very large margin of profit—50 per cent upon the cost of manufacture—but it is to be considered that although these contractors have heretofore been paid their investments and fair profits thereon, yet that such profits are not by any means extravagant, and are not greater than manufacturers often realize on commercial work where no great risk of orders is taken when the enterprises are entered upon. Although in my opinion it is entirely fair, when looking back at the transactions between the Government and these companies, to consider the moneys invested and moneys realized as accomplished facts and to argue therefore that the risks which once existed are no longer to be taken into consideration, yet it is also a fact that these companies did take great risks in good faith, and the Government ought therefore to be willing with its eyes open to allow them liberal profits in the future. It must also be remembered that we require and receive armor equal to the best made elsewhere, and that we often raise our requirements, always demanding that we shall have the best armor that can be made. This requires many experiments that are costly.

Finally, Congress should bear in mind that it has never before, at least in so important a matter, undertaken to fix a price for manufacturers. It is only by pursuing in such case a liberal course that we can expect contractors in the future to take great risks when entering into business relations with the Government. We must not permit them to have any reasonable ground to fear that if they embark upon enterprises for the Government it will afterwards use its power to deprive them at all points and at every stage of their relations with it of all and every chance to make any very considerable profits.

In fixing upon this price I have, at the bidding of Congress, performed a most delicate duty and given my opinion. Congress may determine upon different figures, but I beg to urge that in deciding this question it will not fail to take in view all the considerations favoring a liberal treatment of these contractors.

The Government is now paying for reformed nickel Harvey armor \$563 per ton, with the nickel, which is furnished by the Government, added, \$583. At the prices herein suggested \$500,000 would be saved in the armor of each battleship, or \$1,500,000 on the three battleships under contract.

It must also be remembered that this price, if Congress shall decide upon it, will be much less than is now being paid by any other Government.

This report proceeds upon the idea that the investigations which have been made show that the prices now being paid for armor, both here and abroad, are greater than should be demanded in the future. I am fully aware of the magnitude of this question. The conclusions at which I have arrived may naturally be expected to have effect upon great interests abroad as well as at home. If Congress shall decide to adopt the recommendations in this report and refuse to pay more than \$400 per ton for first-class armor hereafter, it may be reasonably expected that all the power and acumen that can be brought to bear by interested parties will be exerted to show that this report is in error and to expose any inaccuracies it may contain.

Impressed by these considerations, as well as by the primary purpose of doing justice to the two companies whose affairs it has become my duty to investigate, I have proceeded throughout this whole matter with extraordinary care, and have availed myself of every possible source of information, sparing neither labor nor pains. Nevertheless, I can not hope to have avoided error in every particular.

It is possible that those who have had experience in the manufacture of armor, and who are thoroughly acquainted with all its processes and with the cost of every item of material and labor, may be able to point out errors in some particular, but I have great confidence in the accuracy of the general results attained, and fully believe that if any errors have been committed in the conclusions herewith submitted they have been as a whole in favor of rather than against the contractors. If errors have been committed, they are such as could and would have been avoided if the companies whose affairs have been under inquiry had seen proper to afford the means of information.

There is a method by which the general results attained herein can be shown to be erroneous, if they be so, and that is by an exhibition of the books of these companies to the committees of Congress. It has been my most earnest wish not to do any injury to the contractors, and if wrong is done them by the recommendations of this report, no one will rejoice more than I if they shall be able to expose and correct it.

If the contractors shall accept the conclusions at which Congress may arrive, after this investigation, the results, it is hoped, will eventually prove of value both to them and the Government. Congress will be more willing in future to authorize new armored vessels when it becomes thoroughly understood that heretofore the prices of armor were not unreasonably high because plants were not paid for, and that contractors' investments having now been paid for, prices will be much smaller

while profits will still be liberal. It is nevertheless possible that the contractors will refuse to accept contracts at the prices herein recommended. If Congress shall determine that these prices, or any other, are fair and equitable, and shall decide not to pay any more, it should determine upon the course it will pursue in case the contractors refuse to accept its conclusions. At present the law provides that the Secretary of the Navy shall let out all contracts for armor and gun steel to the lowest bidder, after advertisement, and there is no power in the department to procure armor elsewhere than from American manufacturers. Unless, then, this law be changed, the Secretary could not obtain armor for the battleships already under contract if the contractors should refuse to bid within the limit Congress might fix.

I therefore recommend that if Congress shall determine by law upon any limit of price to be paid, it shall also authorize the department to erect or buy an armor plant and a gun plant, and, if need be, to lease such plant or plants until it can construct its own. At the last session of Congress I gave, in response to an inquiry from the Committee on Naval Affairs of the United States Senate, the opinion that the Government ought to buy its armor rather than manufacture it. The reasons set forth in that communication are still believed to be sound, and yet it is possible for the Government to manufacture its own armor, and it would be better to do so than to pay a price which would seem to Congress and the public to be extravagant. We now assemble our great guns at the Washington Navy Yard, and we do it successfully.

If the Secretary of the Navy should be given full power, not only to erect, or buy, and to operate an armor plant, and also full power to contract for armor and gun steel as might seem to him to be for the interest of the Government, the situation would be better for the Government and for the contractors as well. Should contractors see that the Government is willing at all times to pay fair profits for these great necessities for self-defense, they may also come to feel when they see that the Secretary has full power in the premises that so long as they do efficient and faithful work, at reasonable rates, they will have Government patronage, and if the affairs of the Navy and of the War Department were thus conducted, upon a basis and at prices thoroughly understood by the public and the Government, relations could be established and maintained between the Government and those who would serve it in this respect which would be mutually advantageous.

I have the honor to be, very respectfully,

H. A. HERBERT,
Secretary of the Navy.

Senator CHILTON. Now, Mr. Dinkey, of course you understand the difference between making laws and executing laws. The Bureau of Corporations executes the laws that Congress shall see fit to place upon the statute books, which require it to keep that information confidential. We approach it from an entirely different attitude, and for a different reason. There is no law binding us in this investigation, except the instructions of the Senate to report the facts. We are trying to get the facts, and what I want to know is exactly your attitude.

Mr. DINKEY. We are willing to give the committee the information asked for, but unwilling to have it made part of a public document.

Senator CHILTON. As I understand you, then, you would be unwilling to let us have that compilation except upon the condition that we keep it confidential. We have not the power to give you that assurance; we have nothing to do with that. It would be purely a matter of private understanding with every member of the committee, because every member could go off and speak about it, if he wanted to afterwards, and there is no rule of the Senate or law or anything to protect you.

Let me understand you, again, on another matter: You say that the report or what you know as the "Tillman report," the recent report on this subject and the figures therein given fixing \$265 as the cost of armor plate is correct. Do you claim that that approximates the engineering cost and that it was about correct?

Mr. DINKEY. The cost which an engineer, familiar with the business, with access to the process for years and years—

Senator CHILTON. Will you answer me this: You have, through accountants, gotten the actual cost of some operations for the Government, some contracts that you are about to complete or had completed, and that is contained in the paper which is under discussion?

Mr. DINKEY. Yes.

Senator CHILTON. Does the actual working out of a contract as shown by that paper confirm your statement that the \$265 is the proper cost?

Mr. DINKEY. Yes; in these papers the cost is higher.

Senator CHILTON. The actual working out, then, came to more than \$265?

Mr. DINKEY. Yes.

Senator SWANSON. That was only half capacity.

Senator CHILTON. That does not make any difference, from my standpoint.

Mr. DINKEY. This is what the armor costs us to make, and it was the only armor we had to make.

Senator CHILTON. In other words, you make an estimate of what it costs you to make the armor which you make.

Mr. DINKEY. You have been asking for armor costs. There [indicating] is the statement made by the public accountants.

Senator CHILTON. But that what you did make, and as to which the paper before you deals, shows a greater cost than \$265?

Mr. DINKEY. It does.

Senator CHILTON. Would you tell us how much greater? I do not want anything but just that one thing—just how much more, if you can tell us?

Senator PAGE. Do I understand that these figures have been submitted to the Secretary of the Navy?

Mr. DINKEY. Not those; no.

Mr. BARBA. The proposition made by Senator Penrose is entirely acceptable to Mr. Dinkey, I am sure.

Senator PENROSE. Let us have the answer of Mr. Dinkey.

Mr. BARBA. I am finding the figures for Mr. Dinkey, for the *Pennsylvania*, for the whole of the contract of that ship.

Senator CHILTON. Answer my question: How do the figures in the paper under discussion compare with the \$265, which we call the "engineering" or the "Tillman" rate?

Mr. DINKEY. Why, about \$80 more.

Senator CHILTON. About \$80 more per ton?

Mr. DINKEY. Yes.

Senator CHILTON. In other words, that shows a cost of about \$345 a ton and the Tillman report \$265?

Mr. DINKEY. \$341.36, and the other was \$262.79.

Senator CHILTON. Mr. Dinkey, you have stated that that report which you have shows the cost of armor plate, for that actual operation to be \$341.36. Is that right?

Mr. DINKEY. Yes.

Senator CHILTON. Is not that what the committee wanted?

Senator PENROSE. I think that is a valuable contribution to the discussion, the result of that question of yours.

Senator CHILTON. I want to know from any member of the committee who does not want him to give trade secrets, whether or not we have not elicited the information desired at this time?

Senator PITTMAN. Mr. Chairman, that is not all I want. I do not know whether that satisfied the Senator from West Virginia. I may say it does not satisfy me. I want to know on what capacity of production that was the basis of cost. I do not know what entered into the question of general or overhead expenses, the details.

Mr. DINKEY. There is no general overhead in that.

Senator PITTMAN. Does that take into consideration the capacity of the plants?

Mr. DINKEY. No. This is the money spent to make that armor; this is the money out of pocket.

Senator CHILTON. How full were you running your plant at the time covered by those figures?

Mr. DINKEY. A little less than a half and more than a third.

Senator CHILTON. A little while ago you stated to the committee that you had made an estimate that if your plant would run at full capacity that the maximum profit which you would make would be 12 per cent.

Mr. DINKEY. That is in this paper [indicating].

Senator CHILTON. What do you mean by 12 per cent—12 per cent upon your capital invested?

Mr. DINKEY. Twelve per cent upon the money in the business.

Senator CHILTON. Upon the actual money in the business?

Mr. DINKEY. Yes.

Senator CHILTON. That is, allowing nothing for any capitalization over and above what is actually invested?

Mr. DINKEY. No; that is \$6,500,000—all money, as nearly as we can tell the actual money in that business at Midvale.

Senator CHILTON. You mean in the armor plate plant?

Mr. DINKEY. In the armor plate section of the plant, the money employed either to buy tools, build factories; lands and equipment and money in the bank.

Senator CHILTON. Would you mind telling me whether or not you have for a year made as much as 12 per cent?

Mr. DINKEY. I do not know. I have only been with the company a short time. Do you think you have, Mr. Barba?

Mr. BARBA. I think we shall in 1915, when it is cleaned up, because we had 8,500 tons.

Senator PENROSE. Mr. Dinkey, just to repeat a little, but to bring out more clearly: The figures on this paper which you have been quoting from were not compiled by the officials of your company but by a chartered accountant, as I understand it.

Mr. DINKEY. By chartered accountants.

Senator PENROSE. Will you repeat again the name of that firm?

Mr. DINKEY. Barrow, Wade, Guthrie & Co., 25 Broad Street, New York City.

Senator PENROSE. They are accountants of the highest standing and unimpeachable integrity, and those figures are theirs, and not that of any employee of the Midvale Co.?

Mr. DINKEY. The figures are theirs, yes, sir; and signed by them.

Senator PENROSE. The figures represent the actual cost in a particular transaction, namely, the making of armor for the *Pennsylvania*?

Mr. DINKEY. Exactly.

Senator PENROSE. You simply ask for those figures the same protection which, on broad grounds of public policy, the department of

the Government extends to the reports of corporations, reports of individuals on income tax, and other similar matters?

Senator PITTMAN. You have not asked any protection on those figures you have given, have you?

Mr. DINKEY. I have given one figure. For the figure I have given, I ask no protection, of course.

Senator PENROSE. Mr. Dinkey, you are perfectly willing to submit that whole report to this committee in executive session, or to sit down with any individual Senators, and go over it with them, are you not?

Mr. DINKEY. I am.

The CHAIRMAN. Right there——

Senator PENROSE. Excuse me, Mr. Chairman; I just want to finish my question, and then I am through.

You are also perfectly willing to go up with a representative of the Committee on Naval Affairs and make an appointment with the Secretary of the Navy and submit the full report to him, and any naval expert that he chooses to bring into the room, are you not?

Mr. DINKEY. I am.

Senator CHILTON. Why is the Carnegie Steel Co. left out of this hearing?

Senator PENROSE. They are 350 miles away, and I suppose too far to come.

Senator LEWIS. As to the accountants, while they made this report they took the figures from your books as your books were entered?

Mr. DINKEY. They are public accountants, and have verified the figures they show in the usual way.

Senator LEWIS. The figures that they used they took from your books as you have entered them there?

Mr. DINKEY. And verified them.

Senator LEWIS. The statements as made in your books?

Mr. DINKEY. Of course; and verified them.

Senator PENROSE. I do not want these gentlemen, Mr. Chairman, to be in the light of holding anything back. I stated when this hearing began that they would submit everything, and they are still willing to do that, within the lines which appeal to me very strongly.

Senator SWANSON. Have you any secrets of manufacture that the Government could use in the process of manufacture of armor plate?

Mr. DINKEY. I think there are a great many things we would not instruct others in, if we knew we were doing it.

Senator SWANSON. What I mean is, there might be in regard to your management, but I mean are there any secrets in the process of manufacture of armor that is not possessed by the Government and equal to any in possession of yourself?

Mr. DINKEY. Oh, I think there are a great many things.

Senator SWANSON. Secrets?

Mr. DINKEY. Well, they are not generally known; let us say it that way.

Senator SWANSON. In the process of manufacture, there are some secrets and processes?

Mr. DINKEY. They are known to but a few people.

Senator SWANSON. I mean, you have some secret processes of manufacture in this armor-plate business that you would not like to disclose?

Mr. DINKEY. There are methods that are based upon individual study, and matters which lie in just a few hands, and they are not talked about; in that way they are secrets. It is not something that is written down and put into the safe and locked up, or anything of that kind.

Senator SWANSON. If the Government ever should manufacture armor plate, would it have a knowledge of all the processes with which it would manufacture armor as efficiently as anybody else? Are there any secrets of the trade held by these armor-plate plants now excepting the process?

Mr. DINKEY. It is my opinion that if the Government would undertake to manufacture armor, their first business would be to hire some of our men who are making armor; and, of course, then it would go with them.

Senator POINDEXTER. Is not every step in the process of filling a Government contract supervised by the Government?

Mr. DINKEY. No; they do not supervise it. They know about it; they do not direct anything.

Senator POINDEXTER. Probably "supervise"—

Mr. DINKEY. They do not direct anything.

Senator POINDEXTER (continuing). Is an incorrect word, but they inspect?

Mr. DINKEY. They observe it and see that we come within certain tolerances that are written in the contract. He is only an observer; he does not direct anything.

Senator POINDEXTER. That seems to me quibbling about a word.

Mr. DINKEY. Oh, no; there is a big difference between directing and observing steel making.

Senator POINDEXTER. I did not say "directing," I said "supervising."

Mr. DINKEY. He does not supervise. Of course, that means "directing."

Senator POINDEXTER. It does not necessarily mean that. That is immaterial.

Mr. DINKEY. A supervisor is supposed to be consulted about whether this or that shall be done.

Senator POINDEXTER. Not at all. If the Government has a man there to see whether or not the work is being properly supplied under a Government contract, he is not in charge of the work, but of course, as one party to the contract, they are interested in it and they have a right to object; and I should think that that would be an interest to the manufacturer, as well as an interest to the Government, to see that the work is going along satisfactorily through all of its different stages.

Mr. DINKEY. Surely.

Senator POINDEXTER. Rather than to wait until it is entirely completed and then take changes on having it approved.

Mr. DINKEY. Surely. But this man who is there brings no help to the process—never brings any help to the process; that is all I wanted to make clear.

The CHAIRMAN. The committee will now take a recess until 3 o'clock this afternoon.

(Thereupon, at 12 o'clock noon, the committee stood at recess until 3 o'clock p. m.)

AFTER RECESS.

The committee reassembled at the expiration of the recess.

The CHAIRMAN. The clerk will call the roll.

(The clerk thereupon proceeded to call the roll and the following Senators answered to their names: Senator Tillman (chairman), Senator Swanson, Senator Penrose, Senator Chilton, Senator Lewis, Senator Page, and Senator Pittman.)

The CHAIRMAN. A quorum is present. The committee will come to order. Mr. Dinkey, will you please take the stand again, and see whether any Senator wishes to cross-examine you?

STATEMENT OF ALVA C. DINKEY, PRESIDENT, MIDVALE STEEL CO., PHILADELPHIA, PA.—Resumed.

Senator PITTMAN. May I ask Mr. Dinkey a few questions?

The CHAIRMAN. Yes.

Senator PITTMAN. Mr. Dinkey, you have testified that the estimate of cost is about \$265, and that it is right, according to the most accurate judgment of men who should know?

Mr. DINKEY. I think that is a very reasonable estimate.

Senator PITTMAN. How do you account for the fact, then, that this actual report of the cost in the *Pennsylvania* case exceeds estimated costs by \$80 per ton?

Mr. DINKEY. This is an estimate of a plant running full. The report is the result obtained in a plant that was running about 3,500 tons.

Senator PITTMAN. Then the result of the figures that you have given on the cost of the *Pennsylvania* depends very largely upon what capacity the plant was being run at that time?

Mr. DINKEY. The cost that will be secured in manufacturing particular orders varies very largely as you run one tonnage or another.

Senator PITTMAN. I understand that. What I am trying to get at is how we can use these figures that you are giving from the report, the total cost in that report, that you tell us was about \$80 more than the estimated cost as given by the committee?

Mr. DINKEY. It is.

Senator PITTMAN. How can we compare those two sets of figures?

Mr. DINKEY. You will have to do just like other people. You will have to use your judgment in matters of that kind. If you have a plant capable of making 7,500 tons, and in that plant you only manufacture 3,500 tons, you may expect to get cost exactly as these two figures exhibit, and such are the results that are secured continually in these armor plants; from year to year these costs vary a very great deal.

Senator PITTMAN. In other words, we could not ascertain from the total figures that you gave from that report whether or not that could be used as a correct estimate of cost, unless we know the conditions attending that cost?

Mr. DINKEY. Yes; I think you will have——

Senator PITTMAN. You have suggested a condition that it was not running full capacity.

Mr. DINKEY. Yes.

Senator PITTMAN. Now, then, there might have been other unusual conditions that went into the cost of that particular contract?

Mr. DINKEY. I am willing to answer that question so far as I can. I think there were no unusual manufacturing conditions.

Senator PITTMAN. I know, but the committee has no way of ascertaining that fact from your conclusions in that report.

Mr. DINKEY. About the only thing that the committee is informed on is that a certified public accountant reports that that is the money we spent in making that armor, and I am willing to add that such a cost is reasonable to expect in any other armor plant under the same conditions, and conditions are normal, except for one thing: It was running at a little less than half capacity.

Senator PITTMAN. And the basis of \$265 is on full capacity?

Mr. DINKEY. On full capacity.

Senator PITTMAN. And that made a difference of \$80 a ton, approximately?

Mr. DINKEY. Approximately.

Senator PITTMAN. The committee, of course, considers your testimony which goes with that report, to the effect that you are working half capacity. Might it not be disclosed by an examination of that report that there were some extraordinary expenses attached to this particular contract that might not be expected under other contracts?

Mr. DINKEY. My judgment is that it will not disclose any extraordinary manufacturing conditions.

Senator PITTMAN. What I am trying to get at is this: If we attempt to use, either in support or in opposition to this bill on the floor of the Senate, just the bare conclusions of the amount that that contract actually cost you (while we will admit that that is true that it cost you that), such conclusions do not give us any line—at least they do not give the Senate any light as to whether it ought to have cost you that; in other words, consideration of the details is essential to the determination of whether or not a cost in any particular contract was universal and natural, or whether it was exorbitant by reason of unusual conditions. I am not urging you to give us other information. That is up to you——

Mr. DINKEY. I think I have answered that when I say that I believe a thorough examination of those figures will disclose no unusual manufacturing conditions.

Senator PITTMAN. Who was this report made for?

Mr. DINKEY. This was made for the Midvale Steel Co.

Senator PITTMAN. Was it made for the purpose of utilization in this particular case, or as one of your general reports?

Mr. DINKEY. Regular operations, and made about a year ago.

Senator PITTMAN. Was it made for the benefit of the stockholders, or your board of directors, or just the general management?

Mr. DINKEY. At that time the president of the Midvale Co. was more than half owner of the plant, and this was made for his benefit.

Senator PITTMAN. For his benefit solely?

Senator PENROSE. It was not made, Mr. Dinkey, for any intended use before this committee, and this hearing was not contemplated and the bill was not prepared at that time. It is an official record from one of the archives of your office?

Mr. DINKEY. It was made a year ago.

Senator PITTMAN. One of the primary objects was to determine the profits of the institution, was it not?

Mr. DINKEY. In the regular course of business, and to show what they were doing in September, 1914.

Senator PENROSE. It was compiled for the information of Mr. Harrow, then president and half owner of the company?

Mr. DINKEY. Yes; more than half owner.

Senator PENROSE. In compiling this, did these accountants go into what is called the "General expense account" at all?

Mr. DINKEY. Oh, yes; but I did not give you that.

Senator PENROSE. He went into that?

Mr. DINKEY. He went into everything and closed it out.

Senator PITTMAN. Would not the accountant, in determining the cost of armor plate, have to take into consideration all general expenses?

Mr. DINKEY. Oh, surely; but the general expenses are not in the figures I gave you. First he produces the manufacturing cost and then he distributes the general expenses. Of course, the general expenses are a part of the whole plant, and they are apportioned then to different apartments, but those items are not in the figures I gave you.

Senator PAGE. Did any part of your overhead expenses enter into this \$340?

Mr. DINKEY. The administration is in there..

Senator PITTMAN. The administration?

Mr. DINKEY. Yes.

Senator PITTMAN. Wait a minute. That is just what I was getting at. That administration includes the salaries of the officers of the company?

Mr. DINKEY. Salaries of the officers.

Senator PITTMAN. President, vice president, treasurer—all the officers?

Mr. DINKEY. All the officers.

Senator PITTMAN. In your other statement you had those items included under general expenses?

Mr. DINKEY. Yes.

Senator PITTMAN. And is this \$80 so included?

Mr. DINKEY. The things that are left are depreciation and interest on capital.

Senator PITTMAN. That was not included in the \$265?

Mr. DINKEY. No; that is not included in that.

Senator PITTMAN. Then, how are we able to determine whether or not that \$342 is reasonable, without knowing what enters into the general expense, and what part of it is general expense?

Mr. DINKEY. That is a question for judgment of people that usually handle figures of that kind; that is the only way you can arrive at that.

Senator PENROSE. Your accountants apportioned it, did they not?

Mr. DINKEY. Yes.

Senator PENROSE. You did not apportion it?

Mr. DINKEY. No. It was made a year ago.

Senator PITTMAN. I am getting back to the conclusions given, from the auditors report on *Pennsylvania*, of so much a ton as a cost—that is a conclusion which we can not accept, because we have not any of the facts to weigh in considering such conclusion.

Mr. DINKEY. What the accountant has done here is money out of pocket, paid for making that armor.

Senator PITTMAN. But it includes general expenses?

Mr. DINKEY. Only what we have paid.

Senator PITTMAN. The \$265, which was estimated by you from your knowledge of engineering to be a fair cost——

Mr. DINKEY. Shop cost.

Senator PITTMAN (continuing). Is \$80 less than the actual cost in *Pennsylvania* case, and that is the first thing that attracted my attention. Why should there be such a discrepancy between what you, as an engineer, said it should cost, and what it actually cost, according to the auditors conclusion? That is now explained by the fact that such cost included general expenses?

Mr. DINKEY. And excluded it from the other?

Senator PITTMAN. And excluded it from the other, but there we are again left without any basis of comparison. Between two things, which have different lines of expenses there can be no comparison with knowledge of such expenses. We get back again to the question of salaries of officers, upon which we can obtain no information.

Senator PAGE. Would you have any objection to stating what part of this covers salaries of your officials, the administration expenses?

Mr. DINKEY. I do not know how they were apportioned; I do not know that. It does not disclose that.

Senator SWANSON. Mr. Grace, in estimating a plant operating at one-half its capacity, put the additional cost at \$79.60. What is the ideal figures you have there, full capacity to one-half capacity?

Senator PAGE. He said about \$80.

Senator CHILTON. \$81.46.

Mr. GRACE. I do not think that is on the same basis, Senator Swanson, as I have it.

Senator SWANSON. I have it before me—sufficient tonnage to operate at one-third.

Mr. GRACE. Mr. Dinkey was talking about a half.

Senator SWANSON. He makes one-half on the cost about \$80, Mr. Grace makes one-third cost \$79.40, which is 60 cents a ton less than you estimated working at your one-half capacity. Could you explain the discrepancy in that estimate?

Mr. DINKEY. The one is an estimate made by an engineer of what is reasonable to expect. This is what has transpired [indicating].

Senator SWANSON. Understood this was Mr. Grace's experience, too.

Mr. DINKEY. That is from the basis of an engineer's expectations.

Senator SWANSON. Was this your experience, Mr. Grace, or just an estimate you took from the chairman report?

Mr. GRACE. And while I should say our experience would confirm, Senator Swanson, that that is about as near as we could come to it from the method of deducting from the cost that we would add to the \$262 our \$80, which is shown there to develop our strict manufacturing cost.

Senator SWANSON. That is, operated one-third the time?

Mr. GRACE. That is right.

Senator SWANSON. \$79.40, and your estimate was, operating half the time, 60 cents a ton more than that—half the capacity?

Mr. DINKEY. The figures I have given you are the actual costs, and show our experience, not an estimate; that is our experience.

Now, Senator SWANSON, it is reasonable in armor making to find a variation even in two years, where the plants may be running about the same capacity, of \$25 a ton.

Senator SWANSON. As I understand it, however, you have included in that administration?

Mr. DINKEY. Yes, costs of every kind.

Senator SWANSON. Everything except depreciation, and what else?

Mr. DINKEY. And interest on the capital employed.

Senator SWANSON. Mr. Grace estimated administration \$30 a ton, working one-third capacity?

Mr. GRACE. That is right.

Senator SWANSON. You added in that, then, the cost of your administration, which would be about \$30 a ton or \$25 a ton, working one-half capacity?

Mr. DINKEY. In this case the administration is distributed over about 20 items, and I can not separate them. This is what the accountant finds we spent.

Senator SWANSON. What did you spend during that time for improvements to keep your plant up to its good condition? Did you spend as much for improvements as the depreciation would amount to?

Mr. DINKEY. The maintenance of the plant, so as to keep it going—those costs are all in here and distributed. I can not pick them out.

Senator SWANSON. Does your plant fix its books, charging up each year to a profit and loss, what it takes to keep its plant fully equipped so it will be as good at the end of the year as at the beginning of the year, and, consequently, there is very little taken off for depreciation?

Mr. DINKEY. Such expenses are made during the year and do show up in the cost of manufacture.

Senator SWANSON. Which is to keep your plant as well equipped and worth as much at the end of the year as it is at the beginning?

Mr. DINKEY. You keep it in the best operating condition you can; that is the right way to say that. We attempt to have our plant——

Senator SWANSON. The plant is worth as much at the end of the year on account of what you spend for improvements, as it was worth at the beginning of the year, and if you do that there has been no depreciation, has there?

Mr. DINKEY. Do you make that as a statement, or are you asking me?

Senator SWANSON. I am asking you.

Mr. DINKEY. Certainly not.

A tool of any description has a certain life. Now, to use it at all you keep it in the best condition, or you cannot operate it economically; but some day you will need a new tool; therefore it is necessary to set up a fund to provide yourself with a new one. Otherwise you are out of business.

Senator SWANSON. What do you think you ought to charge? How much is your capital stock engaged in this business?

Mr. DINKEY. About \$6,500,000—not capital stock, but the money employed in the business.

Senator SWANSON. I have no further questions. You can make any further statement that you desire.

Senator PENROSE. Have you any questions, Mr. Chairman?

The CHAIRMAN. I just wanted to ask Mr. Dinkey this: The last time we had you before the committee in regard to armor you were then president of the Carnegie Steel Co. were you not?

Mr. DINKEY. Yes.

The CHAIRMAN. You are now president of the Midvale Steel Co.?

Mr. DINKEY. Yes.

The CHAIRMAN. Is there any connection between those two companies?

Mr. DINKEY. None at all.

The CHAIRMAN. Is there any connection between you and Mr. Schwab? Are you in any way related to Mr. Schwab?

Mr. DINKEY. He is a brother-in-law.

The CHAIRMAN. Did he marry your sister or did you marry his?

Mr. DINKEY. He married my eldest sister.

The CHAIRMAN. It is all in the family, and yet there is not association?

Mr. DINKEY. I do not know what you mean by the question.

The CHAIRMAN. It is more of a hint than anything else.

Mr. DINKEY. Mr. Schwab nor any of his concern have anything whatever to do with the Midvale Steel Co. I have been engaged in the same line of business that Mr. Schwab has been engaged in all my life. I do not say that his influence has not been of great benefit to me.

The CHAIRMAN. Mr. Schwab was one of Mr. Carnegie's young men?

Mr. DINKEY. Yes: Mr. Schwab was one of the young partners

The CHAIRMAN. Was he not one of the young men Mr. Carnegie developed?

Mr. DINKEY. He is Mr. Carnegie's——

The CHAIRMAN. One of Mr. Carnegie's "boys," as they call him at their banquets?

Mr. DINKEY. Perhaps Mr. Schwab has earned as much of the money he has got as most any other persons ever did.

Senator PENROSE. I think it is generally recognized that Mr. Dinkey is one of the greatest experts in this country in the steel industry, and that he travels on his own feet, regardless of any influence or relationship.

The CHAIRMAN. I am not making any assertion to the contrary or even hinting that way.

Senator SWANSON. Mr. Grace has referred to when they used to have meetings with the Secretary of the Navy, and they would divide this work up among the three plants engaged in the manufacture of armor plates, and reach an agreement about what they ought to do. Were you ever present at any of these meetings?

Mr. DINKEY. I was only present at one meeting that discussed the division of armor, and that was with Secretary Daniels.

Senator SWANSON. You were not present at the former meetings?

Mr. DINKEY. At no others; no.

Senator PENROSE. Mr. Dinkey, you are somewhat familiar with shipbuilding also, although that is not your business?

Mr. DINKEY. Yes; though not in that business.

Senator PENROSE. It is customary to divide up the building of ships among the shipyards in order to keep them going and in order to keep them prepared to serve the Government, is it not?

Mr. DINKEY. It is.

Senator PENROSE. And in the armor plate they are simply following that same policy?

Mr. DINKEY. Following the policy which I think can very easily be shown to be probably the very best policy any Government can adopt. If we should be so unfortunate as to require war materials in great quantity consider the situation you would be in without these private plants, and if you had plants that were officered by the Government only—compare those two situations and you will see you will need all the expert Army and Navy people on the work for which you have trained them, you surely will not want them engaged in manufacturing. If you can distribute the load of furnishing material that you actually need under such circumstances over the whole industry, you will be able to supply yourself in greater quantity and to much better advantage than if you tied yourself to just one plant.

Senator PENROSE. Mr. Dinkey, this bill directing the construction of factories to manufacture armor provides for the appropriation of \$11,000,000. I think you have stated, and I would like to have you state again, about how long it would take to construct a plant, under the conditions existing in the steel business to-day, where there is a great demand for it?

Mr. DINKEY. I think it would be impossible to make any armor in less than three and a half years from the time you start.

Senator PENROSE. What would be the capacity of such a plant as could be constructed within the limits of the appropriation of \$11,000,000, as prices are now in the steel markets for the machinery and for the equipment? I suppose everything is very high now, as the result of the war, is it not?

Mr. DINKEY. Yes, and a great many things are almost impossible to get at all. Such items of machinery as you can get it is reasonable to expect you will have to pay about 50 per cent more for them.

Senator PENROSE. Then, if the Government started now to build an armor plant they would be paying 50 or 60 per cent more than in normal times?

Mr. DINKEY. More than in normal times, and more than in a great many cases.

Senator PENROSE. And, in any event, if it should be the ultimate policy of the Government to build a plant, this is about the least propitious time that the Government could select?

Mr. DINKEY. The poorest time.

Senator PENROSE. For economical expenditure?

Mr. DINKEY. For economical expenditure, and your present needs.

Senator PENROSE. You say there are some elements of equipment the Government would have great difficulty in getting at all?

Mr. DINKEY. Those are the larger tools, like big planers, big presses, big drilling machines.

Senator PENROSE. Where are they made?

Mr. DINKEY. They are only made by a few shops around Philadelphia and in Ohio.

Senator PENROSE. Why could they not be furnished now?

Mr. DINKEY. The shops are full of other work.

Senator PENROSE. Your opinion is from an intimate knowledge of the conditions, that it might become impracticable, if this appropriation was authorized, for the Government to get the necessary equipment at all at the present time?

Mr. DINKEY. They would have to be satisfied with long-deferred deliveries.

Senator PENROSE. Then, your estimate of three and a half years is based on the thought that the equipment could be gotten promptly?

Mr. DINKEY. Could be gotten in a reasonable time.

Senator PENROSE. But if these conditions prevail, as you represent them, it might be five or six years more before they could get that?

Mr. DINKEY. It could easily go over four years.

Senator PENROSE. Supposing this plant were built at \$11,000,000 at present prices, at the end of over four years what would be its maximum capacity working full time?

Mr. DINKEY. I would not place it over 10,000 or 12,000 tons.

Senator PENROSE. To conduct an establishment of that kind, with a capacity of 10,000 tons per annum, what appropriation would be required from Congress, in your opinion, roughly estimated?

Mr. DINKEY. An annual appropriation of \$4,000,000 along in there.

Senator PENROSE. An annual appropriation of at least \$4,000,000 to manufacture the armor?

Mr. DINKEY. Yes; to pay the manufacturing cost of armor.

Senator PENROSE. If, as has been stated, it would be a wise step for the Government to build the plant and throw the key away and not use it as a check on extortion from manufacturers, so-called, or, rather, excessive prices, what would be the loss to the Government, if the plant stood idle, from a business point of view?

Mr. DINKEY. You would lose what your money would be worth. You might say that was at 4 per cent. That is \$400,000 and a little more, and then you would lose your depreciation. That plant will depreciate just the same as any other plant.

Senator PENROSE. What would you figure the depreciation at annually?

Mr. DINKEY. On the whole plant—buildings and machinery and furnaces—easily 6 per cent.

Senator PENROSE. That would be how much?

Mr. DINKEY. \$660,000; which added to \$440,000 would be \$1,100,000. That would be your annual loss, if you did not run it.

Senator PENROSE. And, of course, after the plant was constructed, supposing it was run full or half its capacity, the improvements in the arts call for constant replacement and new machinery?

Mr. DINKEY. New machinery and new methods and in some cases radical changes in operating conditions. Since we have started to make armor, we have had three radical changes in the character of the armor that is made.

The first armor was just a homogeneous nickel-steel armor, which was devised in France by the Crusot Works.

The next armor was devised in America, known as the Harvey, which was the first hard-faced armor.

And the armor with which we are concerned in making now was devised by Krupps. It is a hard-faced armor, with radical changes in composition.

All three of them required a great many changes in the plant.

Senator PENROSE. Of course the Government would lose all the advantage of association with a plant that is engaged in other kinds of iron and steel manufacture, and could not avail themselves of the

advantage of the disposal of by-products in the scrap, which the private concern has?

Mr. DINKEY. An armor plate plant existing by itself will have a great many handicaps as against the armor plate plant which is a part of a regular commercial steel plant.

Senator PENROSE. Could you state a few of those, as they occur to you? It is not important, but as you have referred to it, you might point them out.

Mr. DINKEY. Of course, they are of great importance. A piece of armor plate is probably the highest exhibit of the steelmaker's art. It is a large piece of steel, and it is difficult in all of its operations, by reason of the quality that is required and by reason of its mass.

To get a crew of experts and expert artisans to conduct this work, it reminds one of a kindergarten that supplies pupils all the way along to the colleges. You are drawing from the people who perform the small operations in the commercial end of the business. You have many men to draw from for the purpose of selecting the best operator to work on this high-grade material.

That is one of the chief advantage of having an armor-plate plant as a part of a regular commercial steel works.

Senator PENROSE. Reference has been made to the Government manufacturing gunpowder. As I understand it, that is a comparatively simple process, made after a regular formula?

Mr. DINKEY. I would not like to say anything about the manufacture of powder.

Senator PENROSE. You do not know anything about it?

Mr. DINKEY. I do not.

Senator PENROSE. I think somebody stated that with that exception the Government has never gone into the direct manufacture of an article, but that the things the Government has made have been largely a matter of assembling the parts.

Mr. DINKEY. Similar to machine-shop work.

Senator PENROSE. Of course, there is a vast difference between the two propositions?

Mr. DINKEY. A tremendous difference; all the difference in the world.

Senator PENROSE. When the Government builds a ship they buy the component parts from you and other concerns and put them together?

Mr. DINKEY. The materials are almost all regularly sold in the market.

Senator PENROSE. It is the same way with the guns?

Mr. DINKEY. The same way with those.

The CHAIRMAN. They make their own guns down here at the navy yard?

Mr. DINKEY. They buy the forgings and put the guns together.

Senator PENROSE. They buy the forgings from Bethlehem and Midvale. How far is the gun completed when the Government gets it?

Mr. DINKEY. The forgings?

Senator PENROSE. What does the forging consist of?

Mr. DINKEY. It is a wrought shape to within a half inch of finished dimensions—all tested and suitable for the purpose—definitely known to be suitable for the purpose in all particulars.

Senator PENROSE. All these delicate processes of the proper strength of the gun and everything you are responsible for?

Mr. DINKEY. Approximately. It is all made to conform to the physical requirements.

Senator PENROSE. There is so much misapprehension about the whole subject, talk about the Government making guns, when it does not really make guns, but polishes them off and puts them together?

Mr. DINKEY. A little more than that. [Laughter.]

Senator PENROSE. A little more than that.

Mr. DINKEY. They are finished to size, and that is a delicate operation; but, after all, they have done nothing but machine-shop work.

Senator PENROSE. That is right. As I understand it, you have no objections; you and your associates, to seeing the Secretary of the Navy and discussing fully this proposition with him and showing him the computations of these accountants.

Mr. DINKEY. We have no objection——

Senator PENROSE. As long as they are not made public.

Mr. DINKEY (continuing). To seeing to it that the Secretary or any other responsible officer that the committee might select has our actual figures, as exhibited by the results obtained by the public accountants.

The CHAIRMAN. You know, of course, this committee has no authority to do anything of that kind.

Senator PENROSE. The Secretary has.

The CHAIRMAN. I should not think the Secretary has authority to spend money on anything like that.

Mr. DINKEY. Let us see if we can not state it in another way: We are willing to put somebody in an intelligent position with respect to what these costs are. The only thing that we are unwilling to do—and it is the only thing—is to make public the record of our cost.

The CHAIRMAN. It is different now from what it was when Admiral Strauss and Mr. Padgett and I went to the Carnegie works?

Mr. DINKEY. Well, now, I think you will find——

The CHAIRMAN. You were afraid all those processes would be given your competitors, your trade secrets, your manufacturing secrets?

Mr. DINKEY. No. If I may be permitted to suggest, at that time I was willing and, besides I did send to the Secretary an exhibit of the costs, with the request that he should not use it in any way that would permit it to become public.

Senator PENROSE. You objected to making the statement before the commission's stenographer in public, so it would be known to your competitors here and in Europe?

Mr. DINKEY. We hope to be able to enter the markets of the world with these goods, and we have to meet makers that have been in the business, most of them, longer than we have.

Senator PITTMAN. Mr. Dinkey, do you expect to supply the markets of the world with this armor plate?

Mr. DINKEY. There are only a few places that armor plate can be sold, and that would be in countries that do not manufacture enough within their borders. There are a few such countries.

Senator PITTMAN. Are you looking for such a market?

Mr. DINKEY. I think there will be such a market.

Senator PITTMAN. Suppose there was such a market, that would consume a half of the capacity of your three plants now, and our policy calls for a demand of two-thirds of your capacity, there would be the situation that either the foreign market that you wanted to supply could not be supplied, or the home market would not be supplied?

Mr. DINKEY. The way to answer that is: The home market is the greatest importance to us; we will take care of it.

If there is any idle capacity, of course, we are glad to employ it, but it is only business sense to first take care of our own market.

Senator PITTMAN. Of course, one of the questions you are urging before us is, not to drive you out of business, just a moral phase; and then, on the other hand it has a practical phase. If you are expecting a foreign demand for your product, and that foreign demand was to gradually increase, you would not be driven out of business. If we should build a plant of 10,000-ton capacity, it would only take up half of our present program. There would still be 10,000-ton capacity under the present program, to distribute between the three of you.

Mr. DINKEY. You had it firmly in your mind just a minute ago. The foreign market is a very uncertain market, and it may be that we will not enjoy any of it; and so we must keep our attention on the only market that these plants are built for.

Senator PITTMAN. So you think that there will be an increased demand, probably, from some of these other countries?

Mr. DINKEY. There will be an occasional demand, but that is a question.

Senator PITTMAN. Have we, as legislators, the right to anticipate on behalf of this Government, because the conditions of the world indicate there will be the increased demand for that character of products, such increase demand?

Mr. DINKEY. That is a judgment, of course, each individual must make for himself. If you will ask for my judgment, a demand for armor from the countries that do not manufacture their own war materials is a very uncertain quantity, and it is uncertain as to time.

Senator PITTMAN. What I am trying to get at is this: One of the arguments that you have used to this committee is that we should stimulate these private industries, so that we will have a reserve in case of a sudden demand on this Government for armament.

Mr. DINKEY. I want to urge that.

Senator PITTMAN. Of course that is a very strong argument, but our present program, which I do not think is considered as a very extravagant naval program, will consume two-thirds of the capacity of the existing plants. There are some of the schools of thought in this country that urge that the program is about half large enough, and, if that school of thought should impress its views upon the Senate, the capacity of your plant would be too small, because the present program takes up two-thirds of your capacity, and there would be no reserve. In fact, your plants would not be sufficient to carry out the program that is urged to-day by a great many of the experts in this country.

Mr. DINKEY. The answer——

Senator PITTMAN. What would be your idea about that?

Mr. DINKEY. The answer is that we have heretofore kept capacity available for the Government in excess of anything that they have ever used. I think we are still forceful enough to do that.

Senator PITTMAN. I do not doubt you do that, but if the demand for armament is increased according to the views of a great many eminent statesmen and experts in this country, to an extent double our program, for instance, you would have to enlarge?

Mr. DINKEY. We would.

Senator PITTMAN. And if the Government should take that enlargement off your hands to the extent of 10,000-ton capacity, you would not be run out of business and the Government would still be taking care of the surplus demand? That would answer your question of being run out of business?

Mr. DINKEY. That is a situation that you must make a judgment on for yourselves. What I am pointing out in a matter of that kind, is that the Government, in case a stress would be put upon it for the manufacture of war materials, it will certainly be in a much better condition if it can transfer that load to the general steel manufacturers than it would be if certain departments and officers of the Government were required to stay at a manufacturing plant when they could be used to much better advantage operating things that they have been trained to operate.

Senator PITTMAN. You say it would take probably from three and a half to four years to build this plant. You will not be driven out of business during that time?

Mr. DINKEY. Of course, if you do order any armor between now and then—I ought to point out that the plant has nothing to do now.

Senator PITTMAN. We have nowhere else to get that armor except from you for three or four years; that is, if we are not going to have any plant, and that depends on our naval policy, and other policies, of course.

Mr. DINKEY. Of course——

Senator PITTMAN. If it takes three or four years to anticipate a plant of this kind, and if you were sitting as we are here, and if you believed, as some of us do believe, that there will be an increased demand, probably a steadily increased demand for armor, and it takes that long to prepare for that increased demand, would you not think the sooner we started in to increase, the better?

Mr. DINKEY. Knowing the steel business as I do, I should certainly undertake first to get it from the regular manufacturers of steel.

Senator PITTMAN. But, so we are going to for four years.

Mr. DINKEY. And any other quantity that I might wish to buy.

Senator PITTMAN. In the nature of things, this industry of yours is a monopoly, is it not?

Mr. DINKEY. Of course, I do not think that is the right word to employ.

Senator PITTMAN. I did not mean it in any harsh sense. I am trying to get at it in an economic sense. In other words, there are three of you engaged in this business, no one of you capable of carrying the present naval programme; if any one of you should bid on the whole contract you would have to give part of it to somebody else; there are no other private institutions going into the business, certainly no encouragement to go into it, and, therefore, we must depend upon three certain institutions that are the only institutions that can make

armor in this country. On the other hand you contend that the only person you can depend upon to buy armor from you is the Government; and here is a monopoly in this sense, that three of you own it all, and nobody else would go into it, and the Government has nowhere else to buy it. You are coming to us and saying, "The Government should continue to let us sell it to them, and they should not take any other steps to get a competitor." You may have offered some good reasons for that, but, on the other hand, in every case of that kind, should not the Government be taken into absolute confidence with you when you say to the Government, "Do not furnish the competitor business, but let us continue to make all. We will give you every inside information, and all we ask is a reasonable profit upon this business."

Mr. DINKEY. That is exactly our position. You have stated it exactly.

Senator PITTMAN. How can we get after it unless we have every fact that will let us determine whether or not you are making a reasonable profit or an exorbitant profit.

Mr. DINKEY. I think we have offered to put in the hands of the contracting officer our costs.

Senator PITTMAN. You are willing to give the information?

Mr. DINKEY. Yes.

Senator PITTMAN. To a certain person, but it is not the person that has charge of this legislation, unfortunately.

Mr. DINKEY. Now, he is the Government's officer who will operate under the legislation which you are proposing.

Senator PITTMAN. Not until we legislate upon it.

Mr. DINKEY. But, if I give him all of the facts, he can report to you concerning those facts, and he will know all there is to know. The only thing that we are asking him not to do is to put in a public document our costs. You can go and consult with him, and he can tell you all about armor making.

Senator PITTMAN. I am not criticising what you are doing at all; that is up to you, but I am simply pointing out the difficulties we have.

Mr. DINKEY. I want to point out that the facts are completely available to you.

Senator PITTMAN. I may be perfectly willing to accept the conclusions of Mr. Daniels, and so may Senator Penrose, but unfortunately we are not either killing or passing this bill, when you come down to it. There are some Senators in the chamber who will not take Mr. Daniels' conclusions.

Senator PENROSE. Senator Pittman, as I understand it, it has been recommended by the Secretary of the Navy, some such legislation—and it seems to me that the official of the Government who awards the contract and is familiar with the matter is the proper person to take this matter up; and I am glad you started the questions you have, because I was going to suggest that this matter, of course, will go over until the next meeting of the committee. Senator Lodge wants to be here. My suggestion is that these gentlemen see the Secretary of the Navy, and lay before him their accountant's reports of actual cost, and everything else which they say they are willing to have him see, and discuss with him what they think they can do in the way of suggestion which has been made by themselves and the members of

the committee in the direction of reducing materially and substantially the price of armor to the Government, if they are assured of this program, and then let us meet again next Tuesday.

The CHAIRMAN. Why make it Tuesday?

Senator PENROSE. Tuesday is the regular day for our committee meetings.

The CHAIRMAN. We want to get through with this bill. I do not want to die of old age before we finish with it.

Senator PENROSE. You are liable to be longer lived than any member of the committee. You are the picture of health. I want to examine this testimony, and I know Senator Lodge wants to be here. Certainly it will take these gentlemen two or three days to make an appointment with the Secretary and see him.

Senator PAGE. May I ask a question?

Senator PENROSE. I would suggest that they see the Secretary and talk this whole matter over with him and discuss what they think may be accomplished, and how far they think they can reduce the price of armor to the Government if they are given the absolute assurance of this full program; and find out whether, in the Secretary's opinion, that would be a moving cause and inducement to the Government to drop this proposition at the present, and preparedness is going to cost millions of dollars, and nobody knows where the money is going to come from.

The CHAIRMAN. The Supreme Court has settled all that.

Senator PENROSE. You can, of course, increase income taxes and increase other taxes, but you will leave mighty few people in the Democratic Party.

The CHAIRMAN. That is our lookout. I should think you would be willing to do anything that would leave few people in the Democratic Party.

Senator PENROSE. I have my source of gratification in a great many things you are doing, but in this matter I have the good of the Government at heart. Let us see what can be accomplished in a week, and then if you want to report the resolution, let it go out and take its chances.

Senator PAGE. Are the facts available showing the cost of armor plate to other nations?

Mr. DINKEY. Of course, I have no information on that subject. I would not be surprised if you would not find a scrap on that.

Senator PAGE. As a matter of fact, do you sell armor plate to any other nation than the United States?

Mr. DINKEY. We have sold a little to Italy.

Senator PAGE. It is negligible?

Mr. DINKEY. Yes.

Senator PENROSE. How many years ago was that? Not any in recent years?

Mr. DINKEY. Yes; We had a recent contract with Italy.

Senator LEWIS. Have you had any dealings with Japan?

Mr. DINKEY. We have never sold anything to Japan. I think Japan draws all her supplies from England.

Senator LEWIS. Have you not been able to serve through England what you knew was going to Japan?

Mr. DINKEY. The English manufacturers take care of all that.

Senator LEWIS. You are able to compete?

Mr. DINKEY. They do not even make an inquiry.

Senator PENROSE. Mr. Dinkey, as I understand it, it would be satisfactory for you and your associates to have a conference with the Secretary of the Navy?

Mr. DINKEY. It would be entirely satisfactory.

Senator PENROSE. He is the head of the Navy Department and awards these contracts, and he is the man, not the legislative branch of the Government, to take up these executive matters, and then we will see what he thinks about it, if he talks to you.

Mr. DINKEY. It is perfectly agreeable to us to see the Secretary.

The CHAIRMAN. We have with us a gentleman who has been sitting here patiently all day. Admiral Strauss is a naval expert and the Secretary will be bound to consult with him in reference to this matter, and I would like to have him put on the stand, and let you cross-examine him.

Senator PENROSE. We will be very glad to hear him.

STATEMENT OF REAR ADMIRAL JOSEPH STRAUSS, UNITED STATES NAVY.

(The witness was duly sworn by the chairman.)

The CHAIRMAN. Admiral Strauss, tell us what is your particular relation to the Navy Department.

Admiral STRAUSS. I am Chief of the Bureau of Ordnance, Navy Department.

The CHAIRMAN. You have to do with all the ordnance matters, including the manufacture of gunpowder, etc.?

Admiral STRAUSS. The manufacture and the purchase of guns, gunpowder, armor and all munitions, and ordnance equipment.

The CHAIRMAN. Admiral, I am entirely satisfied with your knowledge of this matter, but these other gentlemen have not heard you to such extent as I have. I would be very glad if any of the Members of the committee should ask you questions.

Senator SWANSON. Admiral, you were a member of the Tillman committee, were you not?

Admiral STRAUSS. Yes, sir.

Senator SWANSON. Will you please state to the committee how the conclusion was reached as to the cost of armor plate at \$262 and some cents, and what was included?

Admiral STRAUSS. We have attached to the bureau inspectors at the three works, and we have an officer in the bureau whose principal duty it is to look out for armor and armor contracts, and, with the assistance of the officers above referred to and the officers of the bureau, the commission ascertained by personal examination what the cost to the United States Government would be for the production of armor.

Senator SWANSON. That is, if the Government were operating the plant itself?

Admiral STRAUSS. Yes; if the Government was operating the plant.

Senator SWANSON. Did you include in that all the charges such as might be incurred by the Navy Department itself?

Admiral STRAUSS. We included in that all of the direct charges for material and labor; all of the overhead charges, maintenance, upkeep, salaries of experts—everything, in fact, except the charges at

the Navy Department, the administrative charges there, which consist of one officer and a stenographer.

Senator SWANSON. As I understand the estimate which you made, which these gentlemen seem to think was a very fair one, 10 per cent more or less would include everything that the Government would have to pay for this armor, if they had the plant located in Pennsylvania, Virginia, Maryland, or anywhere, except the charges at the Navy Department?

Admiral STRAUSS. Yes, sir.

Senator SWANSON. And those charges of administration at the Navy Department you would consider not very large?

Admiral STRAUSS. They would be negligible; yes, sir.

Senator SWANSON. That was based on a plant with a production of how much?

Admiral STRAUSS. The \$262 basis of a 10,000-ton plant, running to full capacity year in and year out.

Senator SWANSON. If it was a 20,000-ton plant, what would you base the cost of armor plate to the Government on?

Admiral STRAUSS. The cost determined for a 20,000-ton plant was about \$230.

Senator SWANSON. \$230, that is running at full capacity?

Admiral STRAUSS. Running at full capacity, 20,000 tons per annum.

Senator SWANSON. Do you include in that estimate any charges for upkeep?

Admiral STRAUSS. Yes, sir.

Senator SWANSON. And depreciation?

Admiral STRAUSS. We allowed in that, besides the maintenance charge—charge for upkeep 2 per cent on the capital invested—large repairs; that is, for the smaller plant, about \$130,000.

Senator SWANSON. From your knowledge of the matter you think that is sufficient charges for upkeep and maintenance?

Admiral STRAUSS. Yes, sir.

Senator SWANSON. This estimate was made in a conservative or real exacting manner?

Admiral STRAUSS. We made the closest estimate that we possibly could.

Senator SWANSON. To try to reach a definite conclusion for what the Government could manufacture this armor for?

Admiral STRAUSS. The law called upon the committee to find out what the plants would cost and what the armor would cost at such plants, and we have very good means of determining it and, I think, did determine very closely.

Senator SWANSON. In that estimate did you include wages for superintendence outside of naval officers?

Admiral STRAUSS. Yes, sir; we allowed for a general superintendent \$15,000 a year.

Senator SWANSON. \$15,000 a year?

Admiral STRAUSS. Yes, sir; and then we had other supervisory officers at \$6,000.

We included in that cost a cost that the Government has to stand and private manufacturers do not, and that is the cost for leave, holiday, and physical disability.

Senator SWANSON. Your labor scale, was that based on an eight-hour day of labor, as provided by the law?

Admiral STRAUSS. Yes, sir.

Senator SWANSON. You are satisfied with an eight-hour labor day, and with a proper allowance for superintendence that that is a fair estimate as to what the Government could produce this armor for?

Admiral STRAUSS. Yes, sir.

Senator PAGE. Is this estimate of yours practically indorsed by the president of the three companies that manufacture armor plate, as I understood from the testimony to-day?

Admiral STRAUSS. I understood so, from the testimony of Mr. Dinkey and Mr. Grace.

Senator PAGE. And did you have access to and did you utilize in any way the facts given to you by these armor-plate factories in making your estimates?

Admiral STRAUSS. Many of the facts we obtained from the manufacturers.

Senator PAGE. Were those facts given to you cheerfully, or was there some difficulty in ascertaining them?

Admiral STRAUSS. If you will refer to the hearings you will find that the vast majority of the questions asked them they declined to answer. In the last part of the report of the hearings will be found every question asked and every question answered.

The CHAIRMAN. Senator Page, have you House Document 1620?

Senator PAGE. I have that, I think.

The CHAIRMAN. That contains all the questions asked and the answers.

Senator PAGE. That would not necessarily answer my question as to whether the Navy Department had access to the books or to the estimates of the manufacturers of armor. I wanted to know whether they utilized those facts.

Admiral STRAUSS. Yes, sir.

The CHAIRMAN. They refused to let us have access.

Senator PAGE. He just said "No," he had access.

Admiral STRAUSS. Only to the plants; we had no access to the books.

The CHAIRMAN. You had no access to the books?

Admiral STRAUSS. We had no access to the books, but we did to the plant. We were given free access to the plants, and in fact we have representatives at each of the plants.

Senator SWANSON. Admiral, do you know of any secret process of manufacture possessed by the armor-plate manufacturers that the Government could not use and make as efficient armor as made by these concerns engaged in the business?

Admiral STRAUSS. I do not believe there are any secret processes about the manufacture of armor plate. One of the big factors in the matter is the general and special knowledge of steel making and handling large ingots. That special knowledge must be gained by experience. I do not believe the most minute description of it would enable anybody to make armor.

Senator PAGE. How would you expect to obtain that expert knowledge?

Admiral STRAUSS. I fancy there would be a reasonable amount of failure at first. We might get some experts, but undoubtedly in the

course of time we would be able to manufacture armor on our own resources.

Senator SWANSON. Have most of the improvements in armor and the demands for it been made by the armor-plate manufacturers or by the Government itself seeking to improve the efficiency of its battleships?

Admiral STRAUSS. I think it was stated here by Mr. Dinkey that there had been three important steps in the process of armor-plate making—perhaps four.

The first armor was a simple slab of wrought iron.

The second armor that was well known and used was the compound plates manufactured in England. They were a combination of a wrought iron backed and steel faced.

Then armor became a very serious factor when the Creuzot Works turned out their homogeneous nickel steel.

The next great advance in armor was made here in Washington at the navy yard. Harvey got the Bureau of Ordnance to experiment with a plate in which the surface was supercarbonized, and that gave rise to harveyized armor; that process was in vogue for several years.

Then Krupp greatly improved the quality of armor by a method of increasing the depth of the hard surface and the tenacity of the back.

That is the history of the progress of armor and probably answers the question.

Senator SWANSON. What I wanted to know especially was whether the Navy Department was continually experimenting and making all kinds of investigations to keep up the most improved and best armor that can be obtained anywhere or not.

Admiral STRAUSS. No. The Navy Department has from time to time increased the severity of the demand for armor. Just as soon as they found that the specifications were being met easily they naturally spurred the manufacturer on to do better.

Senator SWANSON. And the process of manufacture, is it made by specifications of the Navy Department or to what extent does the Navy Department make specifications for this armor?

Admiral STRAUSS. The principal specifications by the Navy Department is the amount of resistance that this armor will have; that is, we measure the resistance of armor ballistically by firing projectiles at it, and that is the real and final test of its value, and we raise these tests from time to time as the art improves.

Senator PAGE. You do not assume to direct them or advise them as to how they shall produce these results?

Admiral STRAUSS. No, sir.

The CHAIRMAN. All the department does is to put the test upon a more and more severe basis as the progress of the armor-making art increases?

Admiral STRAUSS. That is it, sir.

Senator CHILTON. What is the present status of the progress between projectiles and armor?

Admiral STRAUSS. The question you ask it is impossible to answer definitely. You can pierce any armor plate that can be made if you get close enough to it.

Senator CHILTON. And shoot hard enough.

Admiral STRAUSS. And shoot hard enough; and you can shoot hard enough.

The CHAIRMAN. Do you not believe that a plunging shot from above at an angle of 45° would pierce anything that is possible to be made?

Admiral STRAUSS. It does not matter, Senator, how the shot strikes. There is a certain amount of energy in the shot and a certain amount of resistance in the plate.

I want to amend that by saying that when the projectile strikes obliquely its task so far as armor plate piercing is concerned is very much harder.

The CHAIRMAN. It glances?

Admiral STRAUSS. If you are referring to piercing decks, I think there is an exaggerated idea of the ease with which decks can be pierced.

The CHAIRMAN. Was it not demonstrated in the siege of Antwerp that the Krupp shell could blow all the fortifications to pieces, no matter what they were made of?

Admiral STRAUSS. Yes. There is not any question but that concrete fortifications will not stand up against heavy shells loaded with high explosives.

Senator SWANSON. You have given the question of the Government manufacturing its own armor plate and having its plants full consideration, and you are satisfied that the figures in this report of what is known as the Tillman committee are correct, and the Government at those prices can produce its own armor?

Admiral STRAUSS. I think so; yes, sir.

Senator PENROSE. With a reasonable amount of failure, Admiral?

Senator CHILTON. How much armor plate will the Government require from this time on by the naval program?

Admiral STRAUSS. It will require about 120,000 tons of armor in the next five years.

Senator CHILTON. About 25,000 tons a year?

Admiral STRAUSS. It will require 113,000 tons actually to be placed on ships and then the test plates amounting to about 7 per cent must be added to that; in other words, they will have to produce about 120,000 tons in the five-year period.

Senator CHILTON. This bill provides for a plant to cost not exceeding \$11,000,000. Have you gone into that question? I believe you said you had, and that that would build a plant that would produce about 10,000 tons a year?

Admiral STRAUSS. No, sir; that was for the 20,000-ton plant.

Senator CHILTON. This \$11,000,000 is?

Admiral STRAUSS. Yes, sir.

Senator CHILTON. That would not be quite as much as we would need, would it?

Admiral STRAUSS. If the building program is carried out, it calls for 24,000 tons per annum average.

Senator CHILTON. What arrangements did you have in mind, or has the department in view, to provide the other 4,000 tons?

Admiral STRAUSS. We have made no arrangement for the other 4,000 tons.

Senator CHILTON. Have you made any estimate or investigation to enlighten the committee as to how soon with this expenditure we could begin the production of armor?

Admiral STRAUSS. We estimated we would have the plant completed in three years from the time that we were authorized to construct it. That estimate was made about a year ago, and undoubtedly now the time would have to be increased and the cost would have to be increased if the present prices and demand for all these materials remains as at present.

Senator CHILTON. In other words, you can see at least three years of an interim before we could begin the production of armor plate, before the plant would be ready. Now, what is your idea of what would become of us in the three years intervening, what would we do for armor plate in the meantime?

Admiral STRAUSS. We would have to buy our armor plate just where we are buying all of it to-day, from existing manufacturers.

Senator CHILTON. Supposing they would quit making it? Have you contracts covering that period?

Admiral STRAUSS. No, sir.

Senator CHILTON. Have we any guarantee that these private individuals would go on producing armor plate at any figure during that three years that would intervene, knowing that at the end of that time they would be out of business?

Admiral STRAUSS. We can make no contracts for anything until the money is authorized.

Senator CHILTON. I understand that.

Admiral STRAUSS. We do not make any engagements of any sort whatever.

The CHAIRMAN. Along that line I want to say, for the information of the committee, that the present head of the Bureau of Yards and Docks, a man recently appointed, Mr. Harris, who is considered one of the most accomplished civil engineers in the Navy, has, at my request, made a reconnaissance as much as they would allow him to make, both at Bethlehem and at Midvale, and his report to me, through the Secretary of the Navy, is that if the red tape in the Navy Department is cut and he is authorized to construct this armor factory he believes he can complete it in a year and a half, depending, of course, on the possibility of getting the machinery. [Laughter.]

Senator PENROSE. And based on information from this reconnaissance, whatever you call it, around Bethlehem and Midvale?

The CHAIRMAN. He could not get it anywhere else, because there is no other place to study it.

Senator PENROSE. He is an engineer, and not a metallurgist.

Senator SWANSON. Under the authorization to be made at this session of Congress, how long would it be before the battleships or dreadnaughts would require this armor?

Admiral STRAUSS. It has been our custom to order the armor as soon as we could get the armor plans from the shipbuilders; that is, they begin the manufacture of armor, if possible, six months after the contract is made—or about six months.

Senator SWANSON. When is the armor completed and ready for delivery?

Admiral STRAUSS. Lately the armor is completed well in advance of the completion of the ship; but in former years it lagged along, and

sometimes the shipbuilders claimed there was a delay in the completion of the ship due to not getting the armor.

Senator SWANSON. At that time how long did it take, from the commencement of the construction of the armor to complete it, working at full capacity?

Admiral STRAUSS. I can only give you the capacity of the plants. The combined capacity of the three plants to-day is about 27,000 tons, and if you give them the order at the first of the year, I think, with reasonable success, they can have that 27,000 tons completed at the end of the year or very shortly afterwards.

Senator SWANSON. They can complete the 27,000 tons within a year?

Admiral STRAUSS. Yes, sir.

Senator SWANSON. It usually takes two or three years to build a battleship complete and ready for use?

Admiral STRAUSS. It takes about three years, but a considerable portion of the armor has to be manufactured and worked into the ship as it is being constructed.

Senator PENROSE. Admiral, you have stated that this \$11,000,000 would build a plant that would have a capacity of about 20,000 tons a year?

Admiral STRAUSS. Yes, sir.

Senator PENROSE. Mr. Dinkey has stated to-day that, in his opinion, it would build a plant with a capacity of ten or twelve thousand tons. There is considerable difference of opinion there. I would like to ask Mr. Dinkey whether he can explain it.

Mr. DINKEY. I think I have had a little more experience in the business than the admiral has had; and for a great many years I have been very careful to make my estimates a little higher than I did previously because I have had some very bitter experiences before boards of directors when I overran my estimates. So I think to build a 20,000-ton plant for \$11,000,000 you would find it over-run a very great deal.

Senator PENROSE. Admiral, did you read his testimony of last week? Have you had an opportunity of reading the hearings before this committee?

Admiral STRAUSS. I read Mr. Grace's testimony.

Senator PENROSE. Mr. Grace made a number of deductions from the Tillman estimates, to which you have referred. He made some additional deductions which would add to the cost of armor. Do you remember that?

Admiral STRAUSS. No, sir. I am afraid I did not see that report.

Senator PENROSE. Am I correct on that, Mr. Grace?

Mr. GRACE. That is entirely correct. It appears on page 8.

Senator PENROSE. Mr. Grace, you have heard the admiral just state that the actual cost was \$262.

Mr. GRACE. Yes.

Senator PENROSE. Covering everything, deductions for overhead charges and deterioration and everything else. My recollection was you qualified that very largely?

Mr. GRACE. And on the same basis for a plant running full I deduct that the cost of armor would be at all times \$315 a ton.

Senator SWANSON. I understand Mr. Grace did not dispute the figures of Admiral Strauss in connection with the Government plant,

but he thought these additions ought to be made to his plant and other plants of overhead charges and interest.

Mr. GRACE. Senator Swanson, I did not dispute Senator Tillman's board's report in so far as it went. But I do claim that in that cost, as reported by Senator Tillman's board, that he has not included proper administration charges, taxes, and insurance, and interest on plant.

The CHAIRMAN. The Government does not pay any tax.

Mr. GRACE. Interest on plant, investment or interest on working capital; and I can not conceive that the United States Government can invest money in a plant or working capital without having to pay something for that money.

Senator SWANSON. I understand that this estimate of \$262 is an estimate made by this committee as to what it would cost the Government for the manufacture of armor; and then you want to ascertain what it has cost you, and you took that basis of what it cost the Government and added to it other expenses that you had independent of the Government; is not that true, so as to ascertain what armor really cost him?

Mr. GRACE. And taking those figures of Senator Tillman as representing a certain portion of our cost and so far as they go in our cost or in the cost of making armor. I believe they are as near correct as they can be deducted, but I do not consider, either for Government purposes or for our own purposes, that that represents the cost of armor, even to the United States Government now. That is a matter naturally of judgment between Admiral Strauss, or the people who made that report, and myself.

Senator SWANSON. Have you looked over the estimate of this committee as to superintendence, as to managers, and to see whether they are sufficient as contained in their report or not?

Mr. GRACE. For manufacturing purposes, yes; their return cost would represent what is known with us as "manufacturing cost," and it is just as near as we can deduct.

Senator SWANSON. Admiral Strauss states that they included everything, except expenses that might be incurred at their Navy Department here for supervision and administration, in his estimate of \$262. Have you looked over it to see what addition you would make, if it was a Government operated plant?

Mr. GRACE. What additions I would make?

Senator SWANSON. Yes.

Mr. GRACE. First, they would have to have additional administration.

Senator SWANSON. What additional administration?

Mr. GRACE. Admiral Strauss speaks of some rates.

Admiral STRAUSS. On page 29 at the bottom.

Senator PENROSE. We have struck a very serious difference of opinion as to capacity, varying 100 per cent. Now, I would like to find out just what difference there is in cost to the Government?

Mr. GRACE. In reference to the cost of plants, if you wanted me to speak on that, as we deducted at Bethlehem, at the same time this report was being made, I would say I had our engineers prepare an estimate for me of what it would cost us to build at that time a 20,000-ton plant, and I have not those figures with me, but it is somewhere between \$14,000,000 and \$15,000,000.

Senator PENROSE. And now it would be considerably higher?

Mr. GRACE. And now it would be considerably higher on account of changed base prices of materials and labor. But at that time these figures would be the difference between our judgment and the Tillman board's judgment on the cost of building a 20,000-ton plant.

Senator PENROSE. Can we not elucidate this difference, the way Mr. Grace charges up the cost of armor? Where is that, Mr. Grace, what place?

Mr. GRACE. In my testimony it appears on page 8, Exhibit C, the manner in which we concluded and deducted our cost for armor. Certainly, the Government investing \$8,600,000 or \$10,000,000 in an armor-plate plant must have some expenses in carrying that investment.

Senator SWANSON. Three per cent?

Mr. GRACE. In addition to that it must recognize, it seems to me, Senator Swanson, the necessity for the depreciation of that plant, unless all private manufacturing concerns are on a wrong basis.

Senator SWANSON. Admiral Strauss allowed 2 per cent on the capital for depreciation.

Mr. GRACE. Two per cent for depreciation on the capital we would allow.

Mr. DINKEY. That was upkeep, not for depreciation, two different things altogether. You will need a new roof on the building, new sides, new floor, but you do not need them every year, but he has to provide the money for that.

Mr. GRACE. We have a certain amount of upkeep, Senator Swanson, in our cost, and that amount of upkeep is practically what Admiral Strauss has used in his cost in making armor, because our manufacturing cost corresponds right in line with what the Tillman Board has reported for the cost, but in that we have no depreciating figures other than all upkeep of the plant. We have no interest to carry out investment; we have no profit.

Admiral STRAUSS. I would like to say that on page 33 of the Tillman report you will find an item for the large plant of \$100,000 per annum for repairs, and a further item (b) upkeep of plant buildings, extension, overhaul repairs of furnaces and machinery, 2 per cent of installation costs—in other words, there are two items there, given in the estimate.

Senator SWANSON. How much do they aggregate?

Admiral STRAUSS. \$306,638.

Senator CHILTON. And that includes depreciation and upkeep in your figures?

Admiral STRAUSS. It includes all depreciation except replacements—that is, a final replacement due to a part of the plant becoming obsolete. We did not put that in, because it could not be very well predicted.

Mr. GRACE. If this cost, Mr. Chairman, of yours of \$262 attempts to reflect depreciation cost or unusual replacement cost, then I am wrong in assuming that our manufacturing cost is the same as your \$262. It is considerably in excess of that, or to whatever extent we are going to reflect those items. But I was taking it that that was the overhead maintenance of your plant to keep it in condition to manufacture armor. If it is anything beyond that, then our costs are deducted, by what is meant by this Tillman report, on the wrong basis.

Senator THOMPSON. We have never been able to get you to give us specific costs.

Mr. GRACE. Our specific costs, down as far as the Tillman report gives them, confirm the Tillman report. I can not say that any plainer.

Senator SWANSON. We would be very happy if you would furnish us your items as to how you make your cost on armor plates, like this committee did, so that we can compare them and reach a conclusion as to where you are wrong and they are right, or where you are correct and they are wrong; but we have not been able to get that information so we could institute a very full comparison between the items.

Mr. GRACE. Our manufacturing costs, as I say here, from our own books, is within 10 per cent just as near as we can deduct it, as shown by the Tillman report, and I have shown in detail what we estimate we must add for the balance of our cost.

Senator PENROSE. And you think the Government ought to make similar deductions?

Mr. GRACE. If the Government can run their Treasurer's Department, if the Government can run its Auditor's Department and Attorney General's Department, and all general departments without applying a certain amount of that expense to running of the armor plate plant, then it probably will not cost them anything; but we are not in a position to get money for nothing; and we have certainly to provide for obsolescence of our plant. We have gone through 28 years, and we have had unusual charges for obsolescence, and when I say our plant stands us a little over \$7,000,000, that is not counting a penny which we have spent in replacing a great deal of obsolete machinery; and that has been a very large figure.

Senator PENROSE. It does not cover what you spent, but covers present value.

Mr. GRACE. It covers present value as it stood the first of 1914. We have not our inventory of plant completed for 1915.

Senator PENROSE. If the actual money sunk into the plant was shown it would be a good many million dollars more?

Mr. GRACE. It would be considerably more.

Senator SWANSON. This estimate of the Government, as I say, covered main office, laboratory, dispensary, blacksmith shop, carpenter shop, etc., and certainly seems to name down to the most minute detail every individual needed. The plant as outlined seems to have been given very careful consideration.

Mr. GRACE. Senator Swanson, that is very true, and all these items that you see enumerated in this report we carry in our manufacturing costs. They are all inside of the works, as I expressed it the other day. You take the laboratory expense, the power-plant expenses, the carpenter shop, the blacksmith shop, and that is all incident to the manufacture of armor.

Admiral STRAUSS. That is all included in the report.

Mr. GRACE. That is all in this report.

Senator SWANSON. General supervision they have at \$27,500.

Mr. GRACE. The manufacturing men; not one of them outside of the works.

Senator SWANSON. They do not have to have any selling agency. You emphasized it as being very expensive.

Mr. GRACE. We have had to carry the selling agency, and, as I said, it is quite an art to sell the United States Government.

Senator SWANSON. It seems to me they have general superintendents, a metallurgist, a chemist, clerks, stenographers, all at good salaries, and that it was a very good plan. And what I was anxious to get from one of these manufacturing concerns was also a statement of theirs to compare wages and see wherein this was deficient, and see whether it would work well or not, but I have not been able to ascertain whether this additional expense was absolutely necessary or not.

Mr. GRACE. It seems to me, in a measure, you must judge that for yourselves, because we are admitting, so far as this goes, that it is practically correct—practically confirms our own conditions. We have helped the Navy Department arrive at these figures.

The CHAIRMAN. But, Mr. Grace, after you refused to answer our questions last spring, you have been estopped from finding fault with our conclusions.

Mr. GRACE. I hope I am not being put in the light of finding fault with your conclusions.

The CHAIRMAN. And you remember the other day you said in this committee room that within 10 per cent our figures were accurate.

Mr. GRACE. Certainly, and I still maintain that, but I still maintain that you have not a complete cost of armor.

Senator PITTMAN. Then, Mr. Grace, there is nothing left for us to do except to determine as to any additional expenses of the Government; is not that all?

Mr. GRACE. Certainly, and——

Senator PITTMAN. Is not that a matter that can be ascertained easy enough by any business man of judgment by weighing the overhead general expenses that the Government would have to go to?

Mr. GRACE. I think you gentlemen are going to be fair to the present invested capital, and recognizing what our conditions must be, as compared with the Government, and make certainly some allowances for them.

Senator PITTMAN. We will be able to ascertain, Mr. Grace, fairly accurately what the general expenses of this enterprise should be. We already know accurately according to the testimony of both the Government experts and your experts what the factory expenses are. Now, we will be able to ascertain fairly accurately what the general expenses should be for the Government.

Mr. GRACE. I should say you would.

Senator PITTMAN. We are unable to ascertain what the general expenses of your institution should be or what they are, because we can not get at those detail facts.

Mr. GRACE. We have testified in detail as to what those amounts are, Senator Pittman.

Senator PITTMAN. You had 20 per cent some time ago for general expenses.

Mr. GRACE. We have enumerated, using \$100,000, our taxes so much, our interest on invested capital and on working capital.

Senator PITTMAN. I understood you to say administrative expenses, but you do not analyze administrative expenses.

Mr. GRACE. Oh, no; because I have said to you that I simply must make an estimate, because we do not separate them in our business; that is true.

Senator PITTMAN. We have no way of determining your conclusion on that general statement. That is the only definite point we have got out.

Mr. GRACE. Just as I say, we must take those and apply them to the best of our judgment, over our entire business.

Senator PENROSE. As I understand, Mr. Grace, that was your judgment, or the result of accountants' examination?

Mr. GRACE. These are not accountants' judgment in our case; but our own auditor's distribution of those overhead costs.

Senator SWANSON. What was the general overhead charges of your entire plant, when you set aside \$100,000 for this armor plate?

Senator PENROSE. I think that has been testified to.

Mr. GRACE. I think I reported that in my list as \$1,500,000.

Senator SWANSON. What is in capitalization?

Mr. GRACE. The capitalization are bonds and capital of our company, is in the neighborhood of \$65,000,000; that includes all companies, not just at Bethlehem, but our ship-building plants as well.

Senator SWANSON. The amount invested \$6,000,000?

Mr. GRACE. No; \$7,100,000.

Senator SWANSON. About one-ninth, and you simply divide by that one-ninth of the \$100,000?

Mr. GRACE. We tried to be modest. When we have taken \$100,000 we consider that conservative, just the same way that I have considered money invested at 5 per cent. The record of our money borrowed will show that the money cost us more than 6 per cent; but I have put that at 5 per cent.

Senator SWANSON. Admiral, in making this estimate of all individuals and salaries for a complete plant, who aided you in fixing this up, or did you do it yourself?

Admiral STRAUSS. We have stated here the source of estimate for the construction of the plant, and much of the data we got from the Bureau of Yards and Docks, data with which they are familiar—that is, the buildings proper, power plants, etc. A great deal of the data we had from the manufacturers of machinery, the most of the data for a machine plant.

Senator SWANSON. You made a thorough investigation, so as to reach a definite conclusion, and you were satisfied that this is a very safe, good organization that you have prepared?

Admiral STRAUSS. I think that the estimate has been made with as great care as is possible.

We were permitted by the manufacturers to actually inventory their plants and find out what they had in the plants to produce armor, and we took this list of machines, furnaces, cranes, and communicated with the people in the business that supplied such material, and found out what they would then supply them for.

Senator SWANSON. And then you had an inventory of these plants, so you could form an idea of what organization they had, and what was needed?

Admiral STRAUSS. We formed a very close estimate of the number of men required to handle the output that we state in our report.

Senator SWANSON. Are you satisfied that there is an ample allowance made in that direction in this report?

Admiral STRAUSS. Yes, sir.

Senator CHILTON. Admiral, what are the advantages, if any, to the Government in having three or more privately run plants, if the Government could get its armor plate at a fair figure?

Admiral STRAUSS. There is no doubt that having munition plants of any sort actually being operated in the country is a valuable asset.

Senator CHILTON. And the more that you have the units separated the better it would be, would it not?

Admiral STRAUSS. I suppose there would be a military advantage in having them separated.

Senator CHILTON. For instance, if one should be captured or injured, you would have the others.

Admiral STRAUSS. That would be an advantage.

Senator CHILTON. Will you tell me what, in your opinion, would be such a price at which the Government could get armor plate that would make it economical for the Government and that would dissuade it from the idea of having a Government plant?

Admiral STRAUSS. I am afraid I could not give you a figure on that, Senator Chilton. I can not estimate—I do not know what a fair profit is in this manufacture.

Senator CHILTON. Let me ask you this question: Would it be on the whole better for the Government to have privately run plants, if they would furnish armor at a fair profit?

Admiral STRAUSS. If the private firms will furnish armor at a fair profit and will continue to do so under all conditions, I see no especial advantage to the Government in going into the business. It all depends upon what the fair price is.

Senator PITTMAN. Admiral, is it only a question of price; is that the only question now that is disturbing the Government?

Admiral STRAUSS. I think so.

Senator PENROSE. Admiral, would it not be unfortunate if the Government went into this business and the private concerns went out, not only for the progress of the art, but for the needs of the Government?

Admiral STRAUSS. I think it is well for the Government to have competition in producing munitions as well as anyone else. We have an example in France of the Government monopolizing the manufacture of powder, and it has not worked particularly well. I think the Government factories need competition, in order to stir them on both as to quality and price, just as well as we need competition among private manufacturers.

The CHAIRMAN. I am glad you mentioned powder, because you can tell us all about this Indianhead Powder Works down here on the Potomac. Some comment was made on the Government producing its own powder.

Senator PENROSE. Mr. Chairman, I am going to suggest to these gentlemen that they go up to see the Secretary of the Navy, and if the Secretary desires to—and I have no doubt he will—he will notify the admiral to come in, let him see this statement of the sworn accountants about the cost of the armor for the battleship *Pennsylvania*, working the plant to a certain percentage of its capacity, and go over the whole question, and take up the whole matter and see whether, on the line of what Senator Chilton has said, any arrangement can be made with the executive head of the Navy Department, who awards these contracts, with the private manufacturers and

ascertain whether that would have a dissuading influence on the Government going into this proposition at this time, which, in my opinion, is the worst time we could possibly select—of course, I think the Government ought never to have taken it up—but let us give them a chance and let the testimony be printed, permit Senator Lodge to have an opportunity to be here, and other members of the committee. I have no desire to delay, and I do not know why you can not get the bill out next Tuesday; but I do not want that to be binding, because something might turn up.

The CHAIRMAN. The difficulty is, our people will not come here.

Senator PENROSE. We have not done very well.

Admiral STRAUSS. I beg your pardon. I would like to amend an answer to a question I think Senator Chilton asked about the advantages to the Government in having a plant of their own.

Senator CHILTON. Yes, sir; I suggested that. I made my question general, Admiral, so that you could go over the subject.

Admiral STRAUSS. I would like to amend the answer and to state, besides the advantage of cost, that if we had a Government plant we would be able to set a pace as to quality, too. I think there is a chance of that, that we would be able to make better demands as to quality.

Senator SWANSON. Then, if you had a plant manufacturing a certain amount of armor you would never be at the mercy of the manufacturers, either as to price and change of conditions, when they wanted to go into some other business. I mean if you had a Government plant it would be advantageous to the Government never to be at the mercy of the armor manufacturers, would it not?

Admiral STRAUSS. You mean if they choose to quit the armor business?

Senator SWANSON. If they choose to quit the armor business or combine on prices?

Admiral STRAUSS. Yes, sir.

Senator SWANSON. How has it worked in reference to the manufacture of powder, where the Government went into that?

Admiral STRAUSS. We have been very successful in manufacturing powder profitably, and we had one advantage in the manufacture of powder, and that is that we took all of our output, and ever since the plant has been built, we have worked day and night and took every pound of powder that we could make; and that has contributed to the success of the plant, undoubtedly.

Senator CHILTON. Admiral, here is a thing that has been running in my mind: Of course, the steel business has had in this country a wonderful development. It has brought into it a number of very bright minds, and the stimulus for that has been the profits, and private individuals have been paid large salaries, much beyond, I take it, in manufacturing lines, those that we pay our highest-priced officials; and I just wondered whether or not you had given a study to that, and whether or not the salaries which we pay officials would produce that stimulus in the business and that incentive to improve and develop that has resulted from the liberal salaries which have been paid by private concerns?

Admiral STRAUSS. I think we would get along with such men as we could employ. Of course, the Government never does pay as high

salaries as private firms, but Government employment seems to attract men of considerable ability.

Senator CHILTON. There is no doubt about that.

Mr. GRACE. Mr. Chairman, shall we come back here next Tuesday?

Senator PENROSE. I think you better be here next Tuesday. You might want to add something briefly.

The CHAIRMAN. If it would be possible to have the Carnegie Steel Co.'s representative here, I would be very much obliged.

Mr. GRACE. Did you request them to send a representative?

The CHAIRMAN. Senator Penrose was to invite all the armor manufacturers. It is a Pennsylvania industry.

Mr. GRACE. We had an invitation from your secretary, Senator Tillman.

Senator PENROSE. As I understand it, Mr. Chairman, the Midvale and Bethlehem companies are more interested than the other concerns. It is a larger part of their business, and the Bethlehem Co. particularly is a munition proposition, and therefore they are here; and, as far as the other company is concerned, Mr. Dinkey was for 12 years president of that company, and while he does not speak officially for it now, he can throw all the light needed on the question.

Every gentleman who has addressed this committee is an expert metallurgist and operator in the steel business, and has started from the foot of the ladder and worked his way up in the industry. There is no use bringing before the committee lawyers, financiers, and such men, but I wanted to have the operating men with us, who knew the business.

Senator CHILTON. I would like to ask a question of some one who knows. I should take it Mr. Dinkey knows. It is generally understood that the Carnegie Steel Co. is a part of the United States Steel Corporation.

Mr. DINKEY. It is.

Senator CHILTON. I wanted to know, because I see in the morning paper that the president of the United States Steel Corporation indorses this kind of legislation.

The CHAIRMAN. You mean Mr. Gary?

Senator CHILTON. Yes.

The CHAIRMAN. The committee will now stand adjourned to meet at 10 o'clock next Tuesday.

(Thereupon, at 5 o'clock p. m., the committee stood adjourned to meet next Tuesday, February 1, 1916, at 10 o'clock a. m.)

ARMOR PLANT FOR THE UNITED STATES.

TUESDAY, FEBRUARY 1, 1916.

UNITED STATES SENATE,
COMMITTEE ON NAVAL AFFAIRS,
Washington, D. C.

The committee met at 10 o'clock a. m., pursuant to adjournment.
Present: Senators Tillman (chairman), Swanson, Bryan, Johnson, Chilton, Smith (of Maryland), Lewis, Phelan, Penrose, Clapp, Lodge, Page, and Poindexter.

Present, also: Hon. Josephus Daniels, Secretary of the Navy, and Commander Daniel W. Wurtsbaugh, United States Navy, aid.

Senator PENROSE. Was it your idea, Mr. Chairman, to address some inquiries to the Secretary?

The CHAIRMAN. No; I wanted you to make the inquiries.

STATEMENT OF HON. JOSEPHUS DANIELS, SECRETARY OF THE NAVY.

Senator PENROSE. Mr. Secretary, have you read these hearings before the Committee on Naval Affairs, in connection with Senate bill 1417, to erect a factory for the manufacture of armor?

Secretary DANIELS. I have read a part of them.

Senator PENROSE. You are familiar, of course, with the subject?

Secretary DANIELS. With the subject matter; yes.

Senator PENROSE. You are familiar with the subject matter; but as these hearings are down to date I think they are, perhaps, more valuable.

Secretary DANIELS. I did not get the hearings until yesterday afternoon. I have not read them all.

Senator PENROSE. When the committee adjourned last week, Mr. Secretary, it adjourned with the understanding that the armor-plate manufacturers could, if they chose or would, call to see you to pursue the discussion of this matter further with you as the executive head of the Navy Department, and the person who in the final analysis would have to advertise and perhaps frame specifications and come to an adjustment of the matter of price. And I am informed that these gentlemen have called on you, although I am not advised as to the details of the visit.

Will you inform the committee as to the character of the interview and your views on the matter or would you rather have Mr. Grace put on the stand?

Secretary DANIELS. I will make a statement and then Mr. Grace may make a statement, if it is desired.

Representatives of two of these companies, the Bethlehem and Midvale companies, came to see me after you adjourned last week and said it had been suggested by the committee, or some member of the committee——

Senator PENROSE. I suggested it.

Secretary DANIELS (continuing). That they confer with me; and their proposition was that I should appoint an expert accountant or accountants who would go through their books to determine what it costs to produce a ton of armor plate and get all the information in detail; and after doing so I would report to the committee whether, in my judgment, with all this confidential information in my possession, the price they proposed was a reasonable one with a fair profit.

We discussed the matter at some length, and I told them that a year ago or more the Carnegie Co. had sent me a very long and elaborate statement purporting to be the cost of manufacturing armor plate, the investment, the overhead charges, etc., and asked me to look into it to inform myself as to whether it was a proper price to charge in view of their investments and costs. I sent it back to that company without examining it carefully and told them that I could not accept any information confidentially; that any information they gave me about their plant as to its costs, operations, pay of labor, etc., must be a statement which I could lay before the Senate committee or the House committee, as the case might be; that as Secretary of the Navy I could not accept any confidential information; that I would not ask the Senate committee to act upon my statement that I had examined into their affairs and approved or disapproved them; that if they wished to state all these facts before the committee or to me to be transmitted to Congress I would accept them; otherwise I would not. I returned their long statement with that reply.

So I told these gentlemen the other day that I could not under any circumstances agree to enter into any investigation of their plants or accept any confidential statements that they made or that any experts I appointed might make that could not appear in the hearings or go before Congress. It seemed to me that that was the only possible position an executive officer could take.

Senator PENROSE. Of course, they had their explanation about why they did not want to give the details of their business?

Secretary DANIELS. They said they did not wish to give to the public the details of their business, that it would be giving it to their competitors and to the world, but they were willing to give it in confidence to the Secretary of the Navy.

Senator PENROSE. The business, as I understand it, being of an international character, and frequently in the past there has been the most serious competition to acquire methods, patents, and processes——

Secretary DANIELS. Why, as to the international nature of the business——

Senator PENROSE. The possibly international character of the business.

Secretary DANIELS (continuing). The only international business these companies have had that I know of you will find on page 9 of my report of 1913.

Senator PENROSE. Well, we concede, Mr. Secretary, it has not been very large in the past. It is something, however, that might occur.

Secretary DANIELS. Well, in 1894 there was some international business. The Bethlehem Co. sold armor plate to Russia in 1894 at \$249 a ton; at the same time, under the contract of March, 1893, they sold armor plate to the American Government for \$616.14 per ton. In 1911 they sold to Italy at \$395 a ton, while they were charging this Government \$420 a ton. Later they sold it to Japan for \$406.35 a ton, as against prices ranging from \$504 to \$440 a ton to this country.

Since then I understand there have been no international sales; neither has any foreign Government sought to sell in this country, and none of our companies have sought to sell abroad. That being true, they did not raise any objection to making the information public on international grounds.

Senator PENROSE. They did not?

Secretary DANIELS. No. They said their objection to giving the details to the public was that it would disclose their private business to their competitors in America. My reply to that was that they had no competitors in America, for all the manufacturers of armor charged identically the same price.

Senator PENROSE. And they will have fewer competitors, I presume, if the Government keeps on. Was there any further suggestions made, Mr. Secretary?

Secretary DANIELS. Yes. Then we discussed the matter as to price. I told them if they had any statement to make as to the price they would charge in the future I would be glad to have it for consideration. Two of those companies, the Midvale Steel Co. and the Bethlehem Steel Co., submitted letters. The letter from the Midvale Steel Co. is as follows:

Based upon our conversation in your office on Wednesday, January 26, 1916, if a construction program is arranged which will permit the Navy Department to purchase 15,000 tons of armor for delivery during the next five years we will be willing to contract for 40,000 tons, our capacity for five years, the same to be specified at the uniform rate of 8,000 tons per year, at \$402.50, base, per ton, all conditions as to terms, specifications, and manufacturing details to remain the same as provided under the present contract.

Very truly, yours,

A. C. DINKEY, *President.*

The CHAIRMAN. Is that a recent communication?

Secretary DANIELS. January 27, 1916.

Senator PENROSE. That is an offer to supply the armor on this schedule at \$402?

Secretary DANIELS. \$402.50 a ton if we make a contract for five years on the program that the President has recommended.

Senator PENROSE. What is the price the Government is paying now, do you remember?

Secretary DANIELS. \$425. That is a reduction by the Midvale Steel Co. from \$425 to 402.50.

Senator SWANSON. That covers 40,000 tons?

Secretary DANIELS. Yes; that is their capacity. I also received a letter from the Bethlehem Steel Co. It is as follows:

With a view to conforming to the conversation we had with you yesterday, prompted by the suggestion to us of the Senate Naval Committee that the private armor plate manufacturers endeavor to reach an agreement with the Secretary of the Navy on a price for armor sufficiently attractive to him to make unnecessary the proposed legis-

lation before the committee for the construction of a Government armor-plate plant, we respectfully submit the following proposal:

We will undertake to manufacture one-third ($\frac{1}{3}$) or such additional quantity as may be awarded to us, of the armor plate required for the contemplated five-year naval program (estimated at approximately 120,000 tons), for a price of \$395 per ton for side armor, as compared with the price of \$425 per ton now obtaining; similar reductions to be made in other classes.

In quoting this low price we have been prompted by the desire to meet your views as to a satisfactory price for armor and to the end of making it unnecessary, in your judgment, to create Government facilities for this work, and thus, in a measure, save to our interests the large investment we have in this industry.

Very respectfully,

E. G. GRACE, *President*.

Now, these two concerns, as I understand it, proposed to manufacture each one-third at those prices.

Mr. GRACE. One-third or more. My letter says, "a third or any additional amount."

Mr. BARBA. I might say that our capacity is 8,000 a year.

Mr. GRACE. Our capacity is 12,000 a year, Mr. Secretary.

Secretary DANIELS. I received no communication from the Carnegie Co., which has been making one-third of it in the past. The plan heretofore pursued has been—the Midvale company was organized when?

Mr. BARBA. As a company?

Secretary DANIELS. I mean, to make armor plate.

Mr. BARBA. In 1903.

Secretary DANIELS. Up to 1903 there were only two companies, the Bethlehem and the Carnegie, and then the Midvale company came into the business in 1903. They made a bid for making armor plate which was considerably lower than the price that the Bethlehem and Carnegie companies had been charging. But I am informed that when they made this lower bid the award was not made to them.

Senator PENROSE. They did not have a plant at that time, Mr. Secretary, in the opinion of the Government, to make it certain that they could discharge such a contract.

Secretary DANIELS (speaking to Mr. Barba of the Midvale Co.). Did they not make a lower bid after they had a plant?

Mr. BARBA. We made this bid in 1903, after the plant was practically erected. We had prior to 1903 made five separate bids which were the lowest prices quoted, and for the reason noted by Senator Penrose—ostensibly at least—they failed of receiving the award under their earlier bids, but on the bid of 1903 an award was made.

Secretary DANIELS. As I understand it, in 1903 they were the lowest bidder, after the plant was erected, but the Navy Department instead of giving it to the lowest bidder divided it among the three companies at the bid of the lowest bidder. That is right, is it not?

Mr. BARBA. No. I think that year the other two companies got two-thirds of the armor at their quoted prices.

Secretary DANIELS. The Navy Department gave this company that made the lowest bid a third, and then gave the other two-thirds to those other companies at their high prices.

Senator SMITH of Maryland. Did your company offer to furnish all of it at that price?

Mr. BARBA. They did, sir.

Secretary DANIELS. They offered to furnish it all.

The CHAIRMAN. I want to ask you, Mr. Barba, were they in condition then to manufacture it all, or would they have put themselves in condition to manufacture it all?

Mr. BARBA. As was testified a week ago, the Midvale Co. believed itself in a position to manufacture the whole of the armor that would be required for installation on the ships.

Secretary DANIELS. Of course, that all happened before I had any connection with the Navy Department.

Senator POINDEXTER. I wish you would explain, Mr. Secretary, why you did not give them the contract for it all instead of giving a contract for two-thirds at the higher price.

Secretary DANIELS. If I had been Secretary of the Navy I would have done so.

Senator PENROSE. If I may be permitted to interject—as I understand it, it was on a theory which now seems to be obsolete except in connection with shipbuilding. We frequently put in the naval bill the proviso that one battleship shall be built on the Atlantic seaboard and one on the Pacific, to keep the shipyards going. Mr. Grace knows. Am I correct in stating that sometimes in carrying out that policy a higher price is paid for a ship built in one place than for a ship built elsewhere?

Mr. GRACE. You are entirely correct.

Senator PENROSE. Both ships are not given to the lowest bidder. It has been the policy of the Government for 50 years to encourage the manufacturers and individuals in their ability to serve the Government in this connection. These people have all been invited by the Government to go into the armor-plate business. It is not a competitive proposition, strictly speaking, and under the Republican régime and Republican Secretaries of the Navy they have thought it their duty to keep all of them going and not to have what is threatened now, the third company going out of business because the manufacture of armor is too small a part of their enormous business for them to be spending every winter down here in Washington. So it is not unlikely that the third armor plant—I have no authority to speak for them, but they are not represented here. It would seem to me that it is such a small part of their enormous business that they would just as soon get out of it as not.

Senator CHILTON. You refer to the Carnegie Co.?

Senator PENROSE. The United States Steel Corporation.

Senator CHILTON. That is part of it; they own the stock.

Senator PENROSE. When the Midvale Co. came in they were welcomed by the Government, and it was never the theory until within the last few years other than that the Government should encourage them and keep them going.

Secretary DANIELS. They may have been welcomed by the Government, Senator, but when they made the lowest bid and agreed to make armor plate cheaper and agreed to make it all, the Government declined to give them the contract and gave most of it at higher prices to other companies and only gave them a portion.

Senator PENROSE. I do not wish to argue that, Mr. Secretary, but the same policy is adopted regarding the building of battleships?

Secretary DANIELS. No——

Senator PENROSE. If that is to be the policy of the Government, I would like to see all the battleships built on the Delaware, because we can build them cheaper there than anywhere else.

Secretary DANIELS. Our former experience was that what was built on the Pacific coast cost more, and in the bills there has always been the provision for a higher price for ships built on the Pacific coast——

The CHAIRMAN. The percentage was fixed in the bills.

Senator PENROSE. Well, let us follow the rule.

Secretary DANIELS. My experience has been that, though we have built no dreadnaughts on the Pacific coast, the work we have done on the Pacific has been done as cheaply as on the Atlantic. In fact, we have built two or three small ships at Mare Island under the bids made by New York and the other eastern yards.

Senator PHELAN. The estimates of the Mare Island yard have been always lower, as I understand it, than the estimates of private yards. And then those vessels are intended, Mr. Secretary, for those waters, and there is the cost of bringing them over from the eastern yards, and the differential has been added. There is also the added cost of bringing the raw material from Pennsylvania.

Secretary DANIELS. That is largely true, and the wages are, I believe, somewhat larger in the West.

Senator PENROSE. The ultimate cost to the Government is higher, and if we are to abandon our old policy let us award our battleships to the lowest bidder, whether it is Norfolk or Philadelphia.

But that is neither here nor there. I merely wanted to explain that the policy with reference to armor plate has only been the same as that with reference to the shipyards.

Secretary DANIELS. I would like to proceed with my statement about our experience in buying armor.

The CHAIRMAN. Very well, Mr. Secretary.

Secretary DANIELS. The first contract we offered, in 1913, was the armor plate for the *Arizona*, I think.

Mr. BARBA. Yes; No. 39.

Secretary DANIELS. When the bids came in from Carnegie, Bethlehem, and Midvale they were identically the same figure, \$454 per ton.

The CHAIRMAN. You mean to say that these three competitors all happened to hit on the same price?

Secretary DANIELS. To a cent.

Senator POINDEXTER. What year was that?

Secretary DANIELS. 1913. I rejected all these bids on the ground that there had been no competition. Later I had a talk with the gentlemen representing these three companies and told them that we wished competition and that I could not understand how they could hit upon identically the same figure to a cent. Their answer was this: The Midvale people said that some years before that, when bids were offered, they had made the lowest bid but were not awarded the contract and that the department adopted the policy of dividing the contract between the three concerns; and they said, of course, "Why should we bid a lower figure if it is going to be awarded one-third to each of us at the same price?" But I advertised again, and they came down to \$440 per ton, enabling the department to effect a saving of \$111,000 on that contract.

Since then we have had bidding which has varied very little and we have had, of course, practically no competition.

On June 7, 1900, the naval act contained a provision authorizing the building of an armor plant:

Provided, That the Secretary of the Navy is hereby authorized to procure by contract armor of the best quality for any or all vessels above referred to, provided such contracts can be made at a price which in his judgment is reasonable and equitable; but in case he is unable to make contracts for armor under the above conditions he is hereby authorized and directed to procure a site for and to erect thereon a factory for the manufacture of armor, and the sum of \$4,000,000 is hereby appropriated toward the erection of said factory.

He was "satisfied" that the price was "reasonable," and did not build the plant.

In 1895 Secretary Herbert visited Europe and made a thorough investigation into the armor-plate situation. He became satisfied that there was a world-wide agreement by which the manufacturers of one country would not sell in any other country, and he recommended the building of an armor-plate factory as the result of that investigation.

The CHAIRMAN. Mr. Secretary, you evidently believe there is a combination among these manufacturers of armor?

Secretary DANIELS. Well, I evidently believe there is no competition.

The CHAIRMAN. That is a negative way of saying the same thing?

Secretary DANIELS. Not necessarily; because they say to me, very frankly, "We had no inducement to bid; if we bid lower, we do not get any more of the contract than if we bid higher."

The CHAIRMAN. But only the lowest man says that?

Secretary DANIELS. The lowest man; yes.

The CHAIRMAN. The fellow that could not get in explained the reason why?

Secretary DANIELS. And therefore he said, "Why should we bid lower?"

The CHAIRMAN. He would not play in a game where the cards were all stacked before he entered it.

Senator PENROSE. I think it is admitted it is not a strictly competitive proposition. The point of view of the Government has been: Is the Government getting armor plate at a reasonable price and one that can be compared with that which it costs other nations?

The CHAIRMAN. Mr. Secretary, from your experience with the manufacture of smokeless powder by the Government, you are satisfied that the Government can manufacture armor more cheaply in its own factory than it can buy it?

Secretary DANIELS. There is no doubt of that.

The CHAIRMAN. And the ownership of an armor factory would relieve us of future combinations, or perpetual combinations?

Secretary DANIELS. I think this: If we owned it, we would secure competition from outside plants as well as our own. And I believe, in view of the many changes and new construction, the Government ought to have a factory where its own experts would be studying the best methods of making armor plate.

Of course, the private manufacturers and the Government have worked harmoniously trying to perfect the best armor, but I think the Government ought to be doing it itself. At present, the armor-plate factories do not sell abroad, but they have a right to do so, and the armor they are making is the joint product of the brains

of the Navy and the armor-plate experts. They have made the armor plate upon our specifications. If our experts should obtain armor plate in this country that was better than could be obtained in any other country in the world and we wished no other country to have it, we have no guaranty now that it would not be sold abroad.

Take the matter of torpedoes. We have gone into the manufacture of torpedoes pretty largely, and we have had a good many manufactured by private concerns. Two years ago the manufacturers of the torpedo which really was the product of the Navy's inventors working with the private concerns were about to sell those torpedoes to foreign countries, and we had to enjoin them in the courts on the ground that that torpedo was a product of the Navy's brains as well as theirs and it should not go abroad. After litigation it was decided in the courts of New York that the private company could not sell them abroad.

In the course of his opinion Judge Cox said:

This case illustrates the importance of the United States having a manufactory of its own for the manufacture of torpedoes and other implements of war, which are improved and changed from time to time by the addition of ingenious mechanism, which should clearly be kept secret unless our enemies are to profit equally with ourselves in every improvement which the ingenuity of our Army and Navy officers may suggest.

Now, I think the Government ought to make as much as practicable of everything like armor plate, torpedoes, projectiles, and powder—particularly the things that are improving all the time—so as to be able to control them.

Senator SMITH of Maryland. Mr. Secretary, it is not your judgment that the Government should put itself in a position to manufacture them all?

Secretary DANIELS. No; I do not think that is necessary.

Senator SMITH of Maryland. As I understand it, it is your idea that we should have an armor-plate factory for the purpose of knowing what it costs and preventing a monopoly of it?

Secretary DANIELS. In fact, we do not get competitive prices.

Senator SMITH of Maryland. You think it is unwise for us to undertake to manufacture it all, because it would put these other people out of business and destroy the present factories which might be very useful to the Government?

Secretary DANIELS. I have this idea: If you have competition between your own factory and a private factory you get some advantage. If the Government should make all its own ships, for instance, it would not have quite as much competition in the building of ships as if outside people were bidding.

Senator SMITH of Maryland. What is your idea, Mr. Secretary, of the amount of armor plate that would be required per year for the next five years? It is 25,000 tons a year, as I understand it?

Secretary DANIELS. If this program goes through we would need 120,000 tons.

Senator SMITH of Maryland. About 25,000 tons a year for the next five years.

Senator CHILTON. That is 113,000 for our actual needs, and then 7,000 tons for testing purposes.

Senator SMITH of Maryland. Is it your idea the Government should make about 20,000 tons of that per year?

Secretary DANIELS. That is a matter, Senator, for the Congress. My estimates, made in November, allowed for a factory that would make 10,000 tons a year. In the report of the committee they pointed out that you could make it much cheaper if you made 20,000 tons, which of course is true.

Senator SMITH of Maryland. That may be true. If you will allow me to express myself I think it wise for this Government to be in a position to know what is being done in armor plate, and it is wise to know what it costs, but I do not think it is wise that this Government should go in and monopolize the business. I think it is well to keep these factories. Now, the proposition is, if 20,000 tons is to be manufactured, that would put the other people out of business entirely, would it not?

Secretary DANIELS. If we were prepared to make 20,000 tons we would be able to make most of the armor required under this program.

Senator PENROSE. It has been strongly intimated that every one of the private concerns would abandon the business and throw their plants into the junk pile and go into other lines of endeavor.

Senator SWANSON. Mr. Secretary, from your investigation of this subject, what suggestions have you to make to the committee as to Senate bill 1417, as to the amount to be appropriated and the amount of armor contemplated to be manufactured by the Government? Will you read that bill and suggest to the committee what you think would be the most advantageous position for the Government to take in reference to it?

Secretary DANIELS. The most advantageous position for the Government to take, looking at it as a matter of economy, would be to pass this bill.

Senator SWANSON. That is in a broad way, but do you think it would be better to go into the manufacture of armor plate to the exclusion of private concerns or leave a portion of it for private competition?

Secretary DANIELS. In my recommendation and in my estimates, as you will see, I recommended a capacity of 10,000 tons.

Senator PHELAN. I do not know that it has appeared in the testimony here, but I have learned in private conversation that the Krupp concern provided certain munitions, or possibly arms, for the French Government in competition with French private plants, and the deduction was drawn that the French private plants, having been crippled by reason of the competition of the Krupps, were unable to supply the French Government during this war with munitions, certainly not to the extent which otherwise they would have been able to provide them. Is there any truth in that statement?

The CHAIRMAN. I do not know, sir. You startle me by any such statement as that.

Senator LODGE. It took them some time to get into a condition to supply their own munitions.

Senator PHELAN. I think the fact bears on this discussion—if it is true. I do not know.

The CHAIRMAN. That is hearsay so far as I know. If you and Senator Lodge have any evidence as to the accuracy of that statement I would like to have it.

Senator PHELAN. My informant is present in the room. I think it was Mr. Grace who told me that.

Mr. GRACE. I do not think so, Senator Phelan. I have not talked to you on this subject at all, as a matter of fact. If I had any evidence I should be very glad to offer it.

Senator SMITH of Maryland. I think that statement is perfectly reasonable.

Senator PHELAN. Who was it called on me in reference to this hearing? It was not Mr. Snyder; he is not present?

Mr. GRACE. Mr. Snyder is not here.

Senator PHELAN. I know it was one of the gentlemen from the Bethlehem plant. It ought to be a matter of general information.

Secretary DANIELS. You will remember that a few years ago the papers were full of reports that the Krupp concern had bribed or induced certain newspapers in France to advocate a very large armament. There was a sensational investigation and some of the newspapers appeared in a bad light.

Senator PHELAN. Is it not a fact that the Krupps did supply the French Government within the last 10 years?

Secretary DANIELS. I do not know; it could be ascertained.

Senator LODGE. I did not speak in reference to Krupps. The information I have comes from French sources, and it was simply to this effect, that it took them a year after the war began to get their munition plants into such condition as to supply their needs. They were behind, and they had to put in a great deal of extra machinery and extra men in order to meet the demands for munitions.

The CHAIRMAN. That is notoriously so, because England and all of the rest of the European countries that are in this war were not expecting such a gigantic struggle.

Senator LODGE. The situation in England is very different. I am speaking simply of the French. The munition plants there, for whatever reason, had got so far down that they could not possibly meet the demands of the war. They are now meeting them fully.

Senator PHELAN. Having made the statement with the premise that I learned it in private conversation, if it is a fact that the Krupps have supplied the French Government with munitions, is there anybody in this room that can supply that information?

Senator PENROSE. Mr. Grace might be able to answer.

Mr. KING. They did prior to the Franco-Prussian War, sir, but after that it is rather uncertain.

Senator POINDEXTER. I do not think this sort of fishing around for hearsay testimony and rumors amounts to anything, Mr. Chairman.

Senator PHELAN. In making that statement I desired to lay the foundation for this question. Outside of this bill—because I see it does not provide for the acquisition of private plants—has the Secretary of the Navy entertained a proposition to purchase one of the existing plants instead of constructing de novo an armor-plate factory?

The CHAIRMAN. I have never heard of any existing plants being entirely willing to sell. I asked them last year when the committee was up at their different establishments whether they had any idea of selling, and every one of them pooh-poohed it.

Senator PHELAN. Would it not be a wiser policy, instead of by competition destroying an existing plant, to acquire one by purchase or condemnation?

The CHAIRMAN. Well, condemnation would involve such an immense amount of litigation and be so costly that I do not think the Government would enter upon any such speculation.

Senator PHELAN. Assuming these gentlemen representing these various plants would agree to sell at a reasonable price, is there any objection on the part of the committee or in your mind to acquiring an existing plant?

Senator SMITH of Maryland. Is it likely they would sell at a reasonable price now, when there is such a demand for their products? If there ever was an opportunity for them to make money it is now.

Senator POINDEXTER. Has the Secretary completed his statement, Mr. Chairman?

The CHAIRMAN. Mr. Secretary, I notice in your report that you ask for an appropriation for an ammunition plant?

Secretary DANIELS. A projectile plant.

The CHAIRMAN. Is there any reason why this armor plant that we are going to build—I hope—can not also produce the ammunition necessary for the Navy?

Secretary DANIELS. You would have to have different equipment.

The CHAIRMAN. Of course, you would have to have additional equipment.

Secretary DANIELS. If you will notice in my report, I recommended "for armor plate and other munitions." You can make forgings and you can make some other things, but there is no reason why you should not add to that plant other equipment to make certain munitions. But the armor plate machinery itself makes only armor plate.

The CHAIRMAN. We all know that; at least I do, because I am an old hand at this investigation of armor. This was my first work in the Senate when I came here 20 years ago, and I perhaps know more about armor factories than any man on the committee.

Senator LODGE. Mr. Secretary, may I ask you on what are based the figures for the cost of the armor made by the Government plant?

Secretary DANIELS. A special committee, composed of Senator Tillman, Chairman Padgett, and Admiral Strauss, made an investigation. The figures given are from that report. Your committee last year authorized that to be done.

Senator LODGE. Yes; I know.

Secretary DANIELS. And they went into the investigation very carefully. They visited Bethlehem, Midvale, and Carnegie. At the time the appointment of the committee was proposed I hoped the members would be able also to visit European countries, and I think that was part of the idea, to try to ascertain the cost abroad as well as at home.

Senator LODGE. Then the figures you give for the cost of armor plate manufactured by a Government plant are based on that report?

Secretary DANIELS. They are based on that report.

The CHAIRMAN. These manufacturers of armor have agreed that it is only 10 per cent wrong. I believe that was the testimony last week.

Senator LODGE. In those figures of the cost of Government manufacture do you include interest, overhead charges, insurance, and everything of that sort?

Secretary DANIELS. Yes.

Senator SWANSON. I think they include everything except interest.

Secretary DANIELS. Do they not include interest?

Senator PENROSE. It is only fair to say on that point that this matter was thoroughly discussed the other afternoon, and there was a difference of opinion between this Tillman report and the statement of Mr. Grace and his associates.

Senator SWANSON. I think they stated, Senator Penrose, there would be only 10 per cent difference between what it has cost them, as shown by their books, and the estimate contained in this report.

Senator PENROSE. Down to the period where you get that figure, but there are other deductions that should be made.

Senator SWANSON. Mr. Secretary, do you think it would be advantageous to the Government, as suggested by the Senator from California, to make the erection or purchase of an armor-plate factory optional with the department; to give you the power to purchase an existing plant if you saw proper, or to erect one if you saw proper? What do you think would be the advisability of leaving that optional with the department?

Secretary DANIELS. I think if we could purchase one at a reasonable price it would be better than to build, because we would get it cheaper.

Senator SWANSON. It would be available at once; otherwise there would be a delay of three years?

Secretary DANIELS. Two or possibly three years. We might complete it in 18 months.

Senator LODGE. This plant you propose is a 10,000-ton plant?

Secretary DANIELS. That is my estimate.

Senator CHILTON. The bill provides for 20,000 tons.

Senator LODGE. Will you kindly tell me again what will probably be the annual consumption?

Secretary DANIELS. It all depends, of course——

Senator LODGE. I understand—on what we authorize.

Secretary DANIELS. On the proposed building program it will be 120,000 tons for the five years.

Senator LODGE. One battleship requires about 8,000 tons?

Secretary DANIELS. About that.

Senator LODGE. And we have been authorizing at the rate of two ships—16,000 tons?

Secretary DANIELS. Yes; generally.

Senator LODGE. And the 20,000-ton plant would make all the armor necessary for the battleships unless you added a battle cruiser or a third ship?

Secretary DANIELS. Not all of that, but nearly.

Senator LODGE. I understood the estimate of \$10,000,000 was for a 10,000-ton plant.

Senator PENROSE. Mr. Grace says that is all such a plant would produce. Admiral Strauss differs with him by 100 per cent. He says it would produce 20,000 tons.

Secretary DANIELS. Of course, we estimated on what Admiral Strauss stated in his testimony.

Senator LODGE. And the time he figures is 18 months?

The CHAIRMAN. No; the time necessary, in the opinion of the present Chief of the Bureau of Yards and Docks, Mr. Harris, is that if

you will cut the red tape in the Navy Department—you know what red tape is; I don't—he can build it in 18 months.

Senator LODGE. And these estimates all rest on the opinions of bureau chiefs?

Senator PENROSE. Who are not experts on armor plate.

Secretary DANIELS. You could build it in 18 months or 2 years if there was no delay.

Senator LODGE. I mean, the estimates and everything else rest on the estimates of the bureau chiefs?

Secretary DANIELS. Why, of course.

Senator PAGE. Mr. Secretary, if the exigencies which the President tells us may appear immediately should come to pass, are we not liable to want, perhaps, a great deal more armor plate than has been suggested by any bill before Congress?

Secretary DANIELS. We are not now asking Congress for any more than were put in the estimates.

Senator PAGE. But if there should be a prospect of an immediate war, would not those estimates be doubled, or trebled, perhaps?

Secretary DANIELS. Of course.

Senator PAGE. Then is it not possible that it will be better to postpone the proposed legislation with regard to an armor-plate plant for a year and continue the present status of the parties that are now manufacturing armor until we see what situation is going to confront us in a month or so?

Secretary DANIELS. If it were true we were going to need a great deal more than we have estimated for, then the private plants could not meet our needs and we would need a plant all the more.

Senator PAGE. We should not have that for a year or two, perhaps, and we want now to stimulate and encourage the existing plants to continue their operations and make a large amount of armor plate in the immediate future.

Secretary DANIELS. They have a certain limit to their production now.

Senator PAGE. I think 32,000 tons is the limit stated.

Senator JOHNSON. Mr. Secretary, you said something about the advantage to the Government of preserving secrets if we had our own armor-plate factory. I would like to have you elaborate that.

Secretary DANIELS. I mean by that, there have been a number of improvements. Of course, the Navy's experts are studying how to improve all war munitions. I was illustrating this by the torpedo. I think it would be very valuable for the Government to have its own factory, where its own experts could experiment in making armor plate.

Senator JOHNSON. And preserve the secrets?

Secretary DANIELS. Yes; and try to produce something better. I think that is a very strong argument in favor of having a Government plant. That does not affect the size of the plant, however.

Senator PAGE. And how long, Mr. Secretary, would it be before that plant could be put in operation, if this bill should pass?

Secretary DANIELS. At the best, 18 months.

Senator PAGE. I think the testimony of one of the admirals was it would be nearly twice that. Am I right about that?

Senator LODGE. Yes, sir.

Secretary DANIELS. Two years, I would say, would be nearer right if we had the money available and proceeded at once.

Senator PENROSE. From two to five years the estimates run, I think, according to the testimony.

Senator CHILTON. Mr. Secretary, if you have not explained to the committee I would like to have you explain now your opinion and give us the benefit of your judgment as to the relative difference between putting up a 10,000-ton plant and a 20,000-ton plant. I know there is a difference in cost. I believe you estimated \$230 a ton for the 20,000-ton plant. I mean, to take into consideration all the factors. It might be inadvisable for us to destroy or put out of operation the plants that are now in existence. You must have studied that. Which do you think it would be best for the Government to do now, granting it was determined to build some kind of a plant?

Secretary DANIELS. As I said just now, my estimate was for a 10,000-ton plant, and the advantage of a 20,000-ton plant is that you could get armor plate at about \$32 a ton cheaper.

Senator CHILTON. Well, let us take the present situation as it exists now, taking all those factors into consideration. One of the main reasons you want a plant would be for the experimental tests you spoke of?

Secretary DANIELS. That is one of the main things, but one of the other big things is to get competition in prices.

Senator LODGE. But if the Government makes substantially all the armor plate it needs in a year in its own plant, of course, you would put the others all out of business. Do you think that would be a good thing?

Secretary DANIELS. Well, as I said just now, my recommendation was for a 10,000-ton plant at this time.

Senator LODGE. Exactly; you want to keep competition alive, with the possibility of expansion?

Secretary DANIELS. With the possibility of expansion. If we show on a 10,000-ton plant what I think we will, then it will be another question how much larger we should make it.

Senator SWANSON. Could a plant of 10,000 tons capacity be expanded to 20,000 tons capacity without the loss of much machinery?

Secretary DANIELS. Senator Tillman, you went into that more fully than I did.

The CHAIRMAN. My opinion is it is cheaper to build a larger plant, and I can not see where anything at all would be lost.

Senator SWANSON. I mean, if you should have a 10,000-ton plant and afterwards the developments were such that you wanted to increase it to a 20,000-ton plant could it be done without very great loss on the 10,000-ton plant?

The CHAIRMAN. You would only lose time, in addition to the money necessary to expand it.

Secretary DANIELS. It is just a matter of more units.

Senator SWANSON. So there would not be any material loss in the expansion?

Secretary DANIELS. No.

The CHAIRMAN. I say there would be no loss whatever, but it would be a saving to build a larger plant in the beginning.

Secretary DANIELS. Undoubtedly.

Senator SWANSON. Have you ever had any proposition made to the Navy Department for the sale of any one of these plants at a reasonable price?

Secretary DANIELS. No. A year ago or more, talking to these gentlemen, one of them said, "Well, if the Government is going into this we might as well sell our plant." But it was in a casual conversation; there has been no proposition.

Senator PAGE. Is it not possible, Mr. Secretary, that this is an inopportune time to make the change, in view of what confronts us now?

Secretary DANIELS. Why, I think, in view of the larger program, this is the time to do it.

Senator PHELAN. What has been the effect of the Government's manufacture of gunpowder on prices and quality?

Secretary DANIELS. When the Government began to manufacture smokeless powder it paid to the private company 80 cents a pound.

Later, some years ago, Representatives Sherley began an investigation as to what ought to be the price—about six years ago; I won't say exactly the time. After that investigation Congress fixed the price at 53 cents. We did not manufacture much smokeless powder then. The Sixty-third Congress increased the capacity of the powder factory, so that now we can manufacture, beginning the 1st of March, 6,000,000 pounds a year. It costs us 24 and a fraction cents to manufacture it; that is, the first cost, not counting investment and overhead charges. Counting that, it costs about 35 or 36 cents.

Senator LODGE. That includes everything?

Secretary DANIELS. That includes everything. It is 25 cents if you do not charge anything except the mere cost of the powder; charging everything, it costs 35 or 36 cents.

Senator CHILTON. Factory cost?

Secretary DANIELS. Factory cost.

Senator SWANSON. What has been the experience in connection with the manufacture of guns?

Senator LODGE. I would like the Secretary to finish this matter.

Secretary DANIELS. We can manufacture in the Navy, beginning the 1st of March, all the powder we need in the regular orderly operation as the General Board has prescribed. We can make it all, as I say, at a cost of 25 cents net, or 36 cents with the overhead charges, a very great saving, you see.

The CHAIRMAN. What is the experience of the Government with the lasting qualities of smokeless powder?

Secretary DANIELS. It lasts longer.

The CHAIRMAN. Can it be kept in stock and stored up?

Secretary DANIELS. Every few years we rework this powder, but Admiral Strauss has been able to make it so much better we do not have to work it so often. About once in three years we rework this powder. It used to be worked oftener.

Senator PHELAN. You make it at 35 cents?

Secretary DANIELS. Including all overhead charges; yes.

Senator PHELAN. What is the commercial market price for large quantities of powder?

Secretary DANIELS. Congress fixed the price that we should pay when we buy it outside at 53 cents.

Senator PHELAN. But what do the manufacturers sell it to outside purchasers at?

Secretary DANIELS. I do not know, Senator. A dollar a pound I think they are charging now.

Senator CHILTON. I have heard that.

Secretary DANIELS. My understanding was the Du Pont Co. had a contract abroad for millions of pounds at a \$1 pound.

Senator PHELAN. The same quality of powder?

Secretary DANIELS. I think they make the same quality of powder.

Senator PHELAN. You now manufacture all you need in the orderly routine operation of the Navy?

Secretary DANIELS. We will be in March.

Senator LODGE. But we do not make enough for war?

Secretary DANIELS. No; not for war.

Senator PHELAN. Does it deteriorate by storage?

Secretary DANIELS. Yes; about every three years we have to rework it.

Senator PHELAN. What else does the Government manufacture?

Secretary DANIELS. Torpedoes, some types of guns——

Senator SWANSON. While you are speaking of guns, what was the cost of guns before the Government manufactured them, and what does it cost now to manufacture these guns?

Secretary DANIELS. I would like to look into that. As a general rule, if we can manufacture them cheaper than we can buy them outside we manufacture them, and generally we have been able to do so. Sometimes we have made a contract outside at a lower price than we could manufacture at, but we have made a considerable saving as a whole. If you will let me have a little time to look up the figures, I will put that in the hearings. We have generally made them cheaper than we can buy them outside.

Senator PHELAN. I think this information is very interesting, in view of the fact that a larger part of the opposition to the program of preparedness comes from men who think that those who manufacture munitions are always stirring up trouble and inspiring the war spirit for the purpose of selling their wares. You say that all the powder used in the ordinary orderly routine of the Navy's operations is manufactured by the Government plant?

Secretary DANIELS. Yes.

Senator PHELAN. And what percentage of the small arms?

Secretary DANIELS. Not a very large per cent; a very small per cent.

Senator PHELAN. Torpedoes?

Secretary DANIELS. We manufacture torpedoes, over half.

Senator PHELAN. Then if you manufacture your armor plate and build your ships in navy yards that objection to preparedness would be answered?

Secretary DANIELS. I think it would be a good proposition for the Government in every way.

Senator PHELAN. And in the proportion that you do manufacture these things as a Government, in that proportion would the sentiment against preparedness be allayed?

Secretary DANIELS. That part of the preparedness sentiment that comes from those who get money out of it.

Senator PENROSE. Would that satisfy Henry Ford and William Jennings Bryan, do you think? If that was eliminated would they be for preparedness then?

Senator PHELAN. It would probably deprive them of one of their arguments.

Senator PAGE. Would there be any material embarrassment were we to have war now with a foreign power, in securing the proper amount and quality of powder?

Secretary DANIELS. No, I think not; because our plant and the private plants have been so much engaged recently; but our country always is in a position that if we had war we would have to buy munitions of all kinds.

Senator PENROSE. Mr. Secretary, on that point, if the Government goes into this on the basis of manufacturing all the munitions they require, where will they find private manufacturers able to manufacture munitions when a larger demand occurs in case of war?

Secretary DANIELS. I have not advocated the manufacture of all, Senator.

Senator PENROSE. Take your battleships, your armor plate, your guns, your powder—even Admiral Strauss declared that the policy of France had been a failure in the manufacture of powder. If a war should occur, perchance, an enormous demand will be created, and these individuals will have disappeared like the buffalo.

Secretary DANIELS. I do not think we ought to pay excessive prices because of that fear.

Senator PHELAN. One of the objects of your plan is to determine the cost of these things?

Secretary DANIELS. Yes; and this is true: Take the question of powder—that has now been turned into a science. For a long time we manufactured only a fourth or a third or a half, and we bought additional powder, and we had competition between outside and inside. Now, our experts can make it perfectly, and it would be a very unwise policy for this Government to pay 53 cents when it can make it for 35 or 36.

Take the question of shipbuilding, for instance. I really think we get better results if we have some built at navy yards and some built by private companies, because we get the competition between our own experts and outside experts.

Senator SMITH of Maryland. Do you not think that is the case in regard to armor plate, that we could manufacture some and leave enough for outside parties to encourage them to keep in a prepared state?

Secretary DANIELS. That may be the wisest course, Senator.

Senator CHILTON. That was one of your recommendations; that was one of the considerations.

Secretary DANIELS. In my estimates I estimated that we should make a 10,000-ton plant. That was my recommendation. It is much better as a matter of economy to make it 20,000 tons.

Senator SMITH of Maryland. It might be better possibly to pay a little more and have assistance when you need it, from outside parties, but to build a plant of 10,000 tons would enable you to get at what ought to be paid for it, and it would also stop the monopoly, if there

is a monopoly, and it also would enable you to have the secrets which you think are very valuable, and at the same time not destroy the private industries altogether.

The CHAIRMAN. Mr. Secretary, as to this proposition for a 20,000-ton plant, the estimate of cost is based upon its running all the while—three shifts. It is not customary to run Government plants 24 hours in a day. Therefore, unless there is an emergency, we could reduce the time of manufacturing armor to eight hours a day, and jog along in that way, and the cost would not be as much as we are now paying.

Mr. BARBA. It is not possible, Mr. Chairman, to run an armor plant 8 hours a day. It is not physically possible.

Mr. GRACE. The operations require continuous work.

Mr. BARBA. The operations require absolutely continuous performance 24 hours a day 7 days a week.

The CHAIRMAN. You mean the heat has to be maintained?

Mr. BARBA. Yes, sir. I instanced a week ago in my testimony one operation, which is common to every armor plant, which requires from 18 to 25 days' continuous operation at a temperature of 2,000° F. without cessation. You can not do that on an 8-hour basis.

The CHAIRMAN. That is one of the special parts of the manufacture, however.

Mr. BARBA. You can do that in the case of machines where the tools may stand idle.

The CHAIRMAN. My judgment would be it would be possible for the Government armor factory to run on those processes which are not necessarily continuous in such a way as not to make it necessary, and you could get the same results, and you could expand and run 24 hours a day in an emergency.

Mr. BARBA. But, Senator Tillman, where does your cost go under such an operation as that? When you are working 8 hours a day and the plant is idle 16 hours a day, everything stops more than 16 hours a day. It takes longer than 8 hours a day to pick up and get going. You need a little manufacturing experience, Senator, to show you the truth of these statements I am making to you.

Secretary DANIELS. You asked me just now about the guns. I find I have the facts in my testimony before the House committee last year. It cost something less than \$60,000 to build a 14-inch gun. The Army is making 10 for us at a cost of about \$61,000 apiece. We asked for bids on those 10 guns, and the Midvale and Bethlehem companies bid \$79,000 apiece for them, a difference as against the Army price of approximately \$18,000 and as against the Navy price of \$19,000. That was for 14-inch guns.

Senator PHELAN. Of course, that question of cost is subject to change when you add in the interest on investment and overhead charges?

Secretary DANIELS. All those things enter in, of course.

Senator PHELAN. There is no standardization of statistics, it seems to me.

Senator PENROSE. That is the whole trouble.

Senator LODGE. The costs are almost valueless.

Senator PENROSE. Figures will prove anything about the cost of Government work.

Secretary DANIELS. Well, figures prove as much about Government work as about private work.

Senator PENROSE. I did not go that far; I am willing to admit that, too.

Secretary DANIELS. These figures, though, absolutely show the cost to the taxpayers.

Senator SWANSON. But this was after bids. Bids were made for 14-inch guns, and the navy yard had all its plant, and the Army had its plant and overhead charges, and a bid was made by the Army to construct ten 14-inch guns for the Navy, and the difference between the Army price and the price submitted by the outside bidders was \$18,000 on each gun.

Senator PHELAN. That is due to the fact that the Government is not paying dividends to stockholders.

Senator PENROSE. And not paying taxes.

Secretary DANIELS. But do not forget we have equally large overhead charges. The leave, liability, and sickness amount to from 10 to 12 per cent, and outside companies do not have these charges.

Mr. KING. We have every bit of that.

Secretary DANIELS. Some of it. They do not give the leave that we give; they do not have those outside charges that we have. So you must consider both; I do not mean to say they equalize each other, but you must consider both.

Senator PHELAN. There is one thing certain, that the Government does not pay more than they would have to pay if they employed private concerns.

Secretary DANIELS. In most instances they pay less, and when they pay more they get it outside. Now, when we gave these bids out, if Midvale and Bethlehem had bid lower for these guns they would have gotten them.

Mr. KING. Would you have shut down your plant, sir?

Secretary DANIELS. Sometimes it might possibly be better to temporarily stop a portion of the plant if we could get them cheaper.

Mr. BARBA. Mr. Chairman, I would like to call attention to a fact about the manufacture of small guns.

The CHAIRMAN. Do you mean rifles?

Mr. BARBA. Four-inch rifles, 5-inch rifles, and such as are going on our smaller naval units. That is the type of gun which can be produced most quickly and rapidly in time of stress and emergency. The Midvale Steel Co. has not had an order for these small guns in three years, due to the fact that the Washington Navy Yard and the Watervliet Arsenal have taken every gun the department had to give out; and the Midvale Steel Co.'s tools and equipment are idle so far as those guns are concerned. The men, the expert workmen on lock mechanism, are scattered and are not any longer in our employ, and to-day we could not make those guns.

Senator PHELAN. Are you making those guns for foreign order?

Mr. BARBA. Not at present, sir.

Secretary DANIELS. But you are taking orders?

Mr. BARBA. We hope to.

Secretary DANIELS. The Midvale Co. declined to take any foreign orders until it recently sold out, and since then it has taken orders.

Mr. BARBA. We hope to take orders for relatively small guns—and large ones.

Secretary DANIELS. Of course, whenever we can make guns cheaper ourselves we make them; when we find it cheaper to go outside and get them we go out outside, like any other business concern.

Mr. MATTHEWS. Mr. Secretary, is there not legislation to prevent your doing that?

Secretary DANIELS. We are compelled by certain legislation to keep our plants working, if we can do so economically. I have forgotten the exact words of the legislation. Before that it often happened the Government factory was standing idle and the contracts were awarded outside. Congress put a provision in the act that we should keep the Government factory busy.

Mr. BARBA. The purpose of my remarks about the small guns was to show the certain atrophy that comes on a plant that is allowed to fall into disuse.

Senator PHELAN. The gentleman says he has orders, if I understand him, for foreign guns?

Mr. BARBA. Not at present; we have made bids. But it will require us to overhaul our plants and reassemble our crews before we can undertake to accept those contracts.

Senator PHELAN. That would be very advantageous to you—to keep your plant going?

Mr. BARBA. Yes; and that is the reason why we do it. We would far rather have our plant filled with the work for which it was designed.

Senator PHELAN. Do you think your foreign orders would probably enable your plant and all other plants in this country to keep in operation?

Mr. BARBA. Yes, a short time; but against the policy of the United States.

Senator PHELAN. Are you familiar with the export trade in munitions?

Mr. BARBA. Yes; pretty well.

Senator PHELAN. Will you state what percentage of the whole amount of munitions goes from the factories of the United States to European battlefields?

Mr. BARBA. It is almost impossible, Senator, to give you such a figure as that.

Senator PHELAN. Is it more than 5 per cent?

Mr. BARBA. Yes, indeed.

Senator PHELAN. It has been stated it was about 5 per cent of the whole amount consumed on the other side.

Mr. BARBA. I think Mr. Grace can give you a very much more accurate statement than I, because I heard him make a remark the other day which showed he had some information. And as he has manufactured very much more in the way of munitions than we have at Midvale I would be glad to retire in his favor. I am certain there is a very large proportion of the stuff being used abroad coming from America to-day, but the plants were largely built as emergency plants. They were remodeled car foundries, remodeled railroad shops, factories of all kinds. And they have, of course, figured on amortizing every bit of their new equipment on the cessation of war orders, and they, of course, will desire to return to their standard line of business.

Senator PHELAN. That is irrelevant anyway.

The CHAIRMAN. I would like to submit this bill to the committee and get a vote on it.

Senator PENROSE. Don't you think, Senator, we had better do that in executive session?

Mr. GRACE. If the hearings are about concluded, I would like to have a few minutes to make one more statement, if it is convenient.

The CHAIRMAN. If Secretary Daniels has finished.

Secretary DANIELS. I believe I have nothing more to add.

STATEMENT OF MR. EUGENE G. GRACE, PRESIDENT OF THE BETHLEHEM STEEL CO., SOUTH BETHLEHEM, PA.—Resumed.

Mr. GRACE. Apologizing to the Secretary, I would like to submit a statement to fill in the testimony on the first day of these hearings, giving the exact details of the Bethlehem Steel Co.'s foreign contracts.

Under contract dated December 16 and 28, 1894, we sold to Russia 1,155 tons of armor, at \$249 per ton. In 1895 we contracted with Russia for 224 tons, at \$249 a ton. A little later in 1895 we sold to Russia 1,137 tons, at approximately \$524 a ton. In 1911 we sold to Italy a little over 2,000, tons at \$438.85 a ton. In October of the same year we sold to Italy 780 tons, at \$426.50 a ton. In 1912 we sold to Japan three test plates, for competitive purposes, for \$390 a ton.

In concluding our hearings before this committee, I respectfully request their attention for a few minutes in listening to a brief summary of what I consider the essential features of the case as we have presented it. To be sure that our position will be clearly and definitely understood, I have written what I should like to present, and in such form as I would like to have it appear in the records.

We have endeavored to place before you the facts entering into this business as it has been conducted since its inception at Bethlehem. We have brought to your attention the total amount of business that our company has enjoyed from the United States Government since beginning the manufacture of armor plate in 1887; the record of each contract as to selling price and tonnages, and the average selling price and tonnages throughout the 29 years that we have served the United States Government. Supplementing that, we have furnished similar information on all armor-plate contracts we have had with foreign Governments. These facts, in our estimation, confirm our contention, namely, that we have at all times dealt fairly; yes, even more than fairly, with the United States Government on the basis at which we have sold them armor. Our selling price to-day is lower than the average selling price which has obtained throughout the 29 years we have been serving the Government, and is materially lower than prices obtaining in either England, France, Germany, Japan, or Austria. And in saying that our price to-day is below the average which has obtained through the life of the industry has more import than the mere statement itself; for it can be said, without fear of contradiction, that the general tendency in the industry has been to higher manufacturing costs on account of the gradually increasing severity of specifications, and the higher cost of materials and labor. Not only have the rates of pay to labor been increased, but legislation created in 1913, known as the 8-hour law,

necessitated on our part the employment of 50 per cent additional men to accomplish the same amount of work.

We have placed before this committee facts as to the amount of money invested in our armor-plate plant as it now exists and a statement showing the cost of making armor in such plant. It is clearly shown, operating the plant as we have been required to over the life of the industry, that we have not received sufficient compensation to make the industry a profitable one, but would have been far better off if we had invested the same amount of money in a good 4 per cent bond, where the interest and principal would have been secure without risk or effort on our part.

Conforming to the suggestions of this committee, we have been in conference with the Secretary of the Navy endeavoring to reach an agreement with him on a price for armor which would be so satisfactory that he could recommend against the creation of a Government armor-plate plant. We respectfully submit at this point our formal proposition to the Secretary:

SOUTH BETHLEHEM, PA., *January 27, 1916.*

SIR: With a view to conforming to the conversation we had with you yesterday, prompted by the suggestion to us of the Senate Naval Committee that the private armor-plate manufacturers endeavor to reach an agreement with the Secretary of the Navy on a price for armor sufficiently attractive to him to make unnecessary the proposed legislation before the committee for the construction of a Government armor-plate plant, we respectfully submit the following proposal:

We will undertake to manufacture one-third, or such additional quantity as may be awarded to us, of the armor plate required for the contemplated five-year naval program (estimated at approximately 120,000 tons) for a price of \$395 per ton for side armor, as compared with the price of \$425 per ton now obtaining, similar reductions to be made in other classes.

In quoting this low price we have been prompted by the desire to meet your views as to a satisfactory price for armor and to the end of making it unnecessary, in your judgment, to create Government facilities for this work, and thus, in a measure, save to our interests the large investment we have in this industry.

Very respectfully,

(Signed) E. G. GRACE, *President.*

Honorable SECRETARY OF THE NAVY,
Washington, D. C.

It will be noted that we have reduced the price of armor by \$30 a ton. We have not received from the Secretary an expression as to whether or not he considers our proposal a satisfactory one. This price has been submitted on the basis that the present proposed five-year naval program becomes effective. On this basis we could expect a return of $7\frac{1}{2}$ per cent, applicable to depreciation and profits. Surely this could not be considered as exorbitant, and if our company did not have its investment in the armor-plate plant, I would unhesitatingly recommend against such an investment, on account of the return not being sufficient to warrant the risk.

We entered this business expecting the cooperation of the United States Government in its development; we increased our investment in the business on request from the United States Government; we have passed through more than one investigation to determine whether or not the business was being conducted on a basis fair to the Government, and I submit that in no case have these investigations shown anything but the most liberal treatment of the Government by all of the companies engaged in making armor. We undertook

the business realizing that we had but one customer, and that customer in a position to make contracts only from year to year. Were we wrong, on entering such a special and hazardous business, in expecting considerate treatment from our customer? It is in no way comparable to a commercial product. An armor-plate plant is not available for the manufacturing of any product other than armor.

Although repeating what I have already said before this committee, it is of such vital importance that I feel that I must restate it. In the event of the United States Government creating a Government armor-plate plant, I realize it immediately renders useless all private plants, and just as soon as legislation is passed authorizing the Government plant, I shall immediately recommend to our stockholders and board of directors that necessary steps be taken to provide for the amortization of the investment in our plant by the time the Government plant can be put in operation.

Senator PHELAN. Is that a Government plant of any capacity?

Mr. GRACE. Senator, a plant of 10,000 tons capacity will more than take care of the past tonnages required by the United States Government during the last 29 years.

We have concrete examples of what might be expected in the operation of Government plants. We have heard testimony before this committee that the good showing made in the manufacture of powder in the Government plant has been accomplished mainly through the plant running full capacity 24 hours a day. We also know, from bitter experience, that the Washington Gun Factory has been operated to practically its full capacity, and the amount of gun work placed with the private manufacturers has been the Government's requirements in excess of the capacity of the Washington Navy Yard.

We are sure, from our long experience in the business, that neither the 10,000-ton or 20,000-ton plant, as estimated on by the Tillman committee, can be built at this time for anything like the figures they have submitted. Our own plant at Bethlehem as it stands to-day, as I have previously stated, inventories more than \$7,000,000. A great deal of this plant has been built without paying profit to contractors, and could not be replaced for \$7,000,000. We also, from our experience, just as firmly believe that in a Government-operated plant, armor can not be made, even by running the plant full, for \$262 a ton, as reported by the Tillman committee. There are costs incident to the making of armor plate which this report has not reflected, and even if it had, there will be a long period of experimentation and coordination of operations before anything like a representative cost can be reached. As against this report, we also have before us the cost of \$490 per ton of armor made in the Government-operated plant of Japan, and this too with all labor rates, skilled and unskilled, considerably lower than corresponding labor in this country.

It would seem to me that this country could not afford to ignore the policy pursued by countries with much larger navies than our own, and consequently much more experience than we have had in creating same. In every instance we see it the policy of such countries as England, France, Germany, Austria, Italy, etc., to encourage the investment of private capital, not only in armor plate plants, but in plants for the constructing and manufacturing of all classes of war

materials. It has apparently been the policy of these countries to recognize such investments as important to their naval and military upbuilding to the end of self-protection. The proposed legislation which you are considering is to the end of destroying the strongest asset this Government can have in the event of it having to battle for its existence.

If we are each year to be called upon to put forth every effort to protect the investments which we have made for the manufacture of war materials, I fear such an effort not worth while. It is quite significant to me that one of the very large and important interests in this particular industry have not seen fit to appear before this committee. Maybe they feel, if they are to be continually in the limelight on account of Government investigation for every armor plate they make, they had better direct their energies in more secure and promising directions. I am positive for our own company, if we are to be continually confronted with this character of legislation, that we had better direct our energies in making investments in more substantial commercial lines, where we have the whole country, yes, the whole world, as customers, instead of depending on a one no-policy customer.

And, now, in conclusion, I should like to make three observations:

First. There is more than sufficient producing capacity in the existing armor-plate plants to meet the needs of the United States Government.

Second. That a representative of the Navy Department has said that there is but one object in view in building a Government plant and that is to obtain a satisfactory price.

Third. That in quoting a price of \$395 per ton for armor plate such price should be a satisfactory one, if this Government proposes to deal fairly with the American armor-plate makers.

I thank you, gentlemen, for listening so patiently.

(Thereupon the committee proceeded to the consideration of executive business, and at 12.30 o'clock p. m. adjourned to meet at the call of the chairman.)



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